

REPORT

October 2016

Project Id: COV2016-2

Sterilizer Initial Performance Test

Prepared for



Covidien LP
195 McDermott Road
North Haven, CT 06473



Prepared by



Canomara LLC
PO Box 941
Simsbury, CT 06070

REPORT

Sterilizer Initial Performance Test

Report Certification

I certify that to the best of my knowledge:

- The information provided in this document is true, accurate, and complete.
- Any deviations from published test methods are identified and described in detail.
- Testing was conducted according to the approved protocol.
- All deviations, method modifications, or sampling and analytical anomalies are summarized in the appropriate report narratives.



James Canora, QSTI
Project Manager

October 7, 2016

Date

REPORT

Sterilizer Initial Performance Test

Table of Contents

<u>Section</u>		<u>Page</u>
1	INTRODUCTION	1
1.1	OVERVIEW.....	1
1.2	CONTACT INFORMATION	1
1.3	REPORT ORGANIZATION	2
2	SUMMARY OF RESULTS	3
3	PROCESS DESCRIPTION	4
3.1	STERILIZATION AND AERATION PROCESS DESCRIPTION.....	4
3.2	LESNI ABATOR SYSTEM	5
3.3	LESNI PROCESS MONITORING	7
3.4	STERILIZATION CYCLES DURING PERFORMANCE TEST.....	8
4	SAMPLING & ANALYTICAL PROCEDURES	10
4.1	ETO EMISSION CONCENTRATION – EPA METHODS 18 AND 25A	11
4.2	GAS FLOW RATE AND MOLECULAR WEIGHT.....	12
4.3	TEST METHOD DEVIATIONS.....	14
5	QUALITY ASSURANCE	15
5.1	SAMPLING AND FLOW EQUIPMENT.....	15
5.2	EPA METHOD 18	15

Appendix

- A** OXIDIZER OUTLET EMISSIONS TEST DATA
- B** OXIDIZER INLET EMISSIONS TEST DATA
- C** SECONDARY AERATION TEST DATA
- D** EPA METHODS 3A AND 25A DATA
- E** METHOD 18 DETECTION LIMIT DETERMINATION AND CALIBRATION CERTIFICATES
- F** HFID CONTINUOUS MONITORING DATA
- G** OXIDIZER EXIT TEMPERATURE MONITORING DATA
- H** PROCESS DATA
- I** PROTOCOL ADDENDUM LETTER
- J** TEST METHOD DESCRIPTIONS

REPORT

Sterilizer Initial Performance Test

Page 1 / 16

1 INTRODUCTION

1.1 Overview

Canomara LLC was contracted by Covidien LP to conduct the initial performance test on an ethylene oxide (ETO) sterilizer process at the North Haven, CT facility. The sterilization process includes two sterilizer chambers vented to a shared control system designed and manufactured by LESNI. The sterilization process is regulated by 40 CFR 63, Subpart O (i.e., the National Emission Standards for Hazardous Air Pollutants for Ethylene Oxide Sterilization Facilities or the MACT rule) and Connecticut Department of Energy and Environmental Protection (DEEP) permits 135-0143 and 135-0144. The project objective was to demonstrate compliance with the permits and 40 CFR 63, Subpart O performance standards, and to develop limits for continuous compliance monitoring as required by Subpart O.

This initial performance test was conducted during a worst case operation designed to satisfy the requirements of Subpart O. The worst case operation was described in detail in the June 2016 protocol, which was approved by EPA. The tests were conducted with two full sterilizer chambers unloaded followed by loading and evacuating four empty chambers.

The LESNI is a two-stage control system that includes a water absorber (balancer) followed by a catalytic oxidizer. Continuous compliance monitoring on the LESNI is conducted with temperature monitoring on the catalytic oxidizer exit and with a heated flame ionization analyzer to monitor the balancer performance. The data from these continuous monitors are included in this report and these data are used to establish a limit for the oxidizer inlet hydrocarbon concentration and a minimum temperature at the oxidizer exit.

1.2 Contact Information

Testing was conducted on August 10, 2016 under the supervision of Mr. James Canora and the tests were coordinated by Mr. Ron Severson, Sr. EHS Specialist, with Covidien. Contact information is as follows:

Ron Severson
Covidien LP
195 McDermott Road
North Haven, CT 06473
203.492.5671
ronald.severson@medtronics.com

James Canora, QSTI
Canomara LLC
PO Box 941
Simsbury, CT 06070
860.865.1166 x800
jim@canomara.com

REPORT

Sterilizer Initial Performance Test

Page 2 / 16

1.3 Report Organization

Section 2.0 of this report contains a summary of results and Section 3.0 describes the process operations. Section 4.0 describes the sampling and analytical methods and Section 5.0 describes the quality assurance procedures. Complete test data and process data are contained in the appendices.

REPORT

Sterilizer Initial Performance Test

Page 3 / 16

2 SUMMARY OF RESULTS

The tests demonstrated compliance with Subpart O and Permit limits for the chamber vent, primary aeration and secondary aeration. The HFID continuous compliance limit was established during the performance test at 307 ppm as propane and the 150 °C minimum catalyst exit temperature was demonstrated to be sufficient. Results are summarized in Table 2-1 and complete data are contained in the appendices.

Table 2-1: Sterilizer Initial Performance Test Results¹

Test No.	1	2	3	Average	DEEP Permit Limit	Subpart O Permit Limit
Continuous Monitoring Data						
HFID - Hourly Average (ppm as C3)	159.89	239.27	207.61	202.26		
HFID - Maximum 1-Minute Average (ppm as C3) ²	282.79	269.62	285.52	279.31		
Oxidizer Exit Temperature (°C) ³	174.9	182.9	181.4	179.7		
Chamber Vent and Primary Aeration Vent Emission Test Data						
Oxidizer Inlet Gas Flow Rate (scfm)	6370	6534	6340	6415		
Oxidizer Outlet Gas Flow Rate (scfm)	6370	6698	6937	6668		
Oxidizer Inlet ETO Concentration (ppm-wet)	522.99	738.95	650	637.18		
Oxidizer Outlet ETO Concentration (ppm-wet)	0.05	0.05	0.05	0.05	1.0	1
Oxidizer Inlet ETO Emission Rate (lb/hour)	22.86	33.14	28.26	28.09		
Oxidizer Outlet ETO Emission Rate (lb/hour)	0.002	0.002	0.002	0.002	0.059	
Destruction Efficiency (%)	99.99%	99.99%	99.99%	99.99%		99%
Secondary Aeration Emissions Data						
Gas Flow Rate (scfm)	10555	11279	11056	10963		
ETO Concentration (ppm-wet)	0.32	0.29	0.27	0.29	1.0	
ETO Emission Rate (lb/hour)	0.023	0.022	0.020	0.022	0.086	

1. Chamber vent and primary aeration testing was conducted simultaneously during a worst case process operation which included three sterilizer charges from Chamber A (18.8, 49.0 and 48.4 pounds of ETO) and three sterilizer charges from Chamber B (22.7, 51.9 and 46.2 pounds). The total ETO emitted to the LESNI for the test was 237 pounds.
2. As per the protocol addendum letter, the HFID continuous compliance monitoring limit is 10% above the average of the maximum 1-minute averages, so the limit is 307 ppm as propane (279.31+10%). Complete HFID data are contained in Appendix F.
3. As per Subpart O, the restriction for a catalytic oxidizer exit temperature is based on a 24-hour average. The 24-averages on August 10 and 11 were 168.0 and 160.8 °C. Temperature data are contained in Appendix G.

REPORT

Sterilizer Initial Performance Test

Page 4 / 16

3 PROCESS DESCRIPTION

Covidien produces a variety of medical and surgical appliances and has recently installed two medical appliance sterilizers. The sterilizers use pure ETO sterilant gas. Emissions from the sterilizer chamber vents and primary aeration vents are controlled with a LENSI Air Pollution Control System. The sterilization process also includes two secondary aeration rooms and these rooms are vented directly to atmosphere as the emission concentration is less than 1 ppm.

3.1 Sterilization and Aeration Process Description

Product to be sterilized is waiting in the staging/preconditioning room (PCR) where it gets exposed for approximately 6 hours to temperatures between 67° - 115° F and humidity of 40% – 70% depending on specific product's needs.

There are two sterilizer chambers, each equipped for 6 pallet loads. Pallets dimensions do not exceed the following dimensions: width 42" x height 71" x length 48". Packaged medical products are loaded into the chambers, conditioned to specified temperature and humidity and sterilized with a maximum 50 pound charge of ETO (20 lbs is typical, the permit allows 50 lbs per batch). The sterilization cycle times are different for different products with a range of 9 to 22 hours. This compliance test is designed for an unlikely worst cast that would include consecutive 9-hour sterilizer cycles on both chambers.

At the end of the sterilization cycle, the chamber gas is evacuated to the LENSI and product is conveyed to the primary aeration rooms. The evacuation process includes multiple pumped evacuations followed by nitrogen charges and this process is referred to as washes. The number of washes is variable depending on the product type, but all evacuations are conducted with the same vacuum pumps exhausted to the balancer tank.

Each sterilizer chamber has a dedicated primary aeration room and each room is equipped with multiple gas collection intakes near the floor. The primary aeration time is typically 12 hours; however, the aeration times vary according to the product being sterilized and the sterilization cycle that is run. After primary aeration, product pallets are moved with a forklift to either of the two secondary aeration rooms. One room is dedicated to suture products and the other room is dedicated to polymer products. Both secondary rooms are exhausted with a shared pair of induced draft fans located on the roof. The two fans are operated in parallel and

REPORT

Sterilizer Initial Performance Test

Page 5 / 16

provide a redundant exhaust fan in the event of failure. The final exhaust to atmosphere is through a 36-inch diameter stack. Secondary aeration rooms are monitored using a PS 9 compliant monitoring system to ensure the ethylene oxide exhaust from these rooms does not exceed 1 ppm. Therefore no emissions control is required for the secondary aeration rooms.

3.2 LESNI Abator System

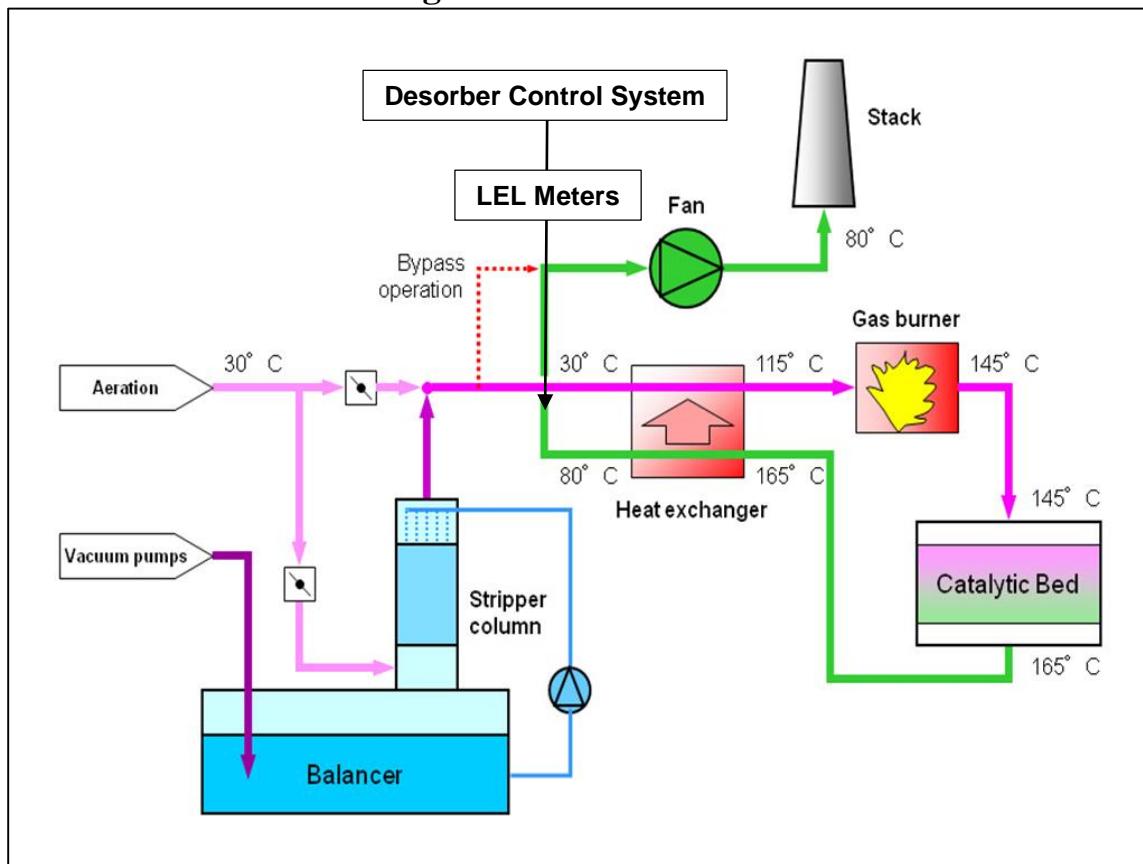
The LESNI Catalytic abator system is designed to control ETO emissions from chamber venting and primary aeration using catalytic oxidation preceded by a balancer that buffers high concentration chamber vent emissions. The LESNI converts ETO to CO₂ and H₂O without chemical additives (sulfuric acid) and without producing ethylene glycol waste. The system is designed to meet the 99% reduction and 1.0 ppm MACT limits. A simplified process schematic is presented in Figure 3-1 and an engineering process and instrumentation diagram (not an “as built” drawing) is presented in Appendix D.

The LESNI receives exhaust gas from the primary aeration rooms through a common duct and from the chamber vents via the balancer. The exhaust fan is located after the oxidizer and this fan maintains a negative pressure on the aeration rooms, the balancer and all associated equipment and ductwork. Aeration rooms are exhausted through floor level intakes and these intakes are connected below the roof to a common 24-inch duct. On the roof, the common aeration room duct is split to two booster fans that are engineered to maintain a negative pressure on the aeration room in the event of a failure with the LESNI fan. The ETO concentration in the primary aeration exhaust is low (typically less than 30 ppm).

The sterilizer chamber evacuations generate high concentration ETO exhaust streams and the LESNI is designed to buffer these high concentrations with an aqueous absorber/desorber identified as the balancer, so that the oxidizer is never subjected to un-buffered gas. The primary functional components of the chamber exhaust system are (1) water sealed vacuum pumps, (2) sparger tubes, (3) balancer tank, (4) stripper column, and (5) desorber control system. These components are shown in Figure 3-1. A detailed description of the LESNI Balancer was included in the *Compliance Monitoring Plan, LESNI Balancer (A component of LESNI APSC for the New 100% Ethylene Oxide Sterilizer)* submitted to EPA and CT DEEP on October 6, 2015. Each chamber has a single dedicated vacuum pump rated for 250 scfm. Each vacuum pump is directly

piped to a sparger tube on the balancer tank that exits below the tank water level so that the incoming gas is bubbled through the water to absorb ETO. The vacuum pumps have water seals and the seal is formed from balancer tank water pumped to and from the vacuum pumps. The balancer tank contains 15,000 liters of water which can absorb up to 450 pounds of ETO per day. The stripper column physically rests on the top of the balancer tank and water is continuously pumped from the tank to spray nozzles located on the top of the stripper column. The sprayed water falls through the column back into the tank through a counter current air flow that enters the bottom of the column. The counter current air flow is a slipstream of the primary aeration exhaust, so that in effect, the balancer absorbs high concentration chamber vent ETO emissions in water and then uses the low concentration primary aeration exhaust air to strip ETO from the water. The balancer tank water temperature is also monitored and controlled to a range of 5 °C to 28 °C.

Figure 3-1: Process Schematic



ETO desorption from the balancer tank is controlled to limit the rate of ETO entering the catalytic oxidizer. This control is conducted automatically with three procedures including the water spray rate at the top of the stripper column, counter current air flow rate through the column (this air flow is a slipstream of the primary aeration exhaust) and a pair of redundant LEL meters located 30 inches downstream of the stripper column return pipe. The control setting at Covidien is 2.5% of the LEL which is equivalent to 750 ppm of ETO. When the LEL is low, the desorption rate is maximized with low water spray rate on to the top of the column and high counter current air flow rate. When the LEL increases as chamber venting occurs, the water spray rate is increased and counter current air flow rate is reduced with a controlled damper to maintain LEL below the set point. The position of this stripper air control damper is a measured and recorded process parameter.

The balancer stripper exit re-combines with the primary aeration exhaust and the combined gas is preheated with a shell and tube type heat exchanger and then enters the gas fired heater. The heat exchanger and gas fired heater raise the temperature to the required catalyst inlet temperature which is 150 °C. The preheated gas enters the catalytic oxidizer and three parallel beds oxidize ETO. The catalyst bed exit gas temperature increases across the beds and temperature is monitored at the catalyst bed inlet and at the outlets of all three beds. Recorded temperatures include the catalyst inlet, catalyst bed outlets, and the average catalyst bed outlet. The average catalyst bed outlet temperature is set to a minimum of 150 °C. The exhaust fan is installed after the catalytic oxidizer, and this single fan provides the necessary suction for extracting the process air through the system maintaining a negative pressure on the exhaust process.

3.3 LESNI Process Monitoring

The sterilizer chamber and LESNI APCS are monitored and controlled with a computer based control system operated in a state of the art control room. Temperature, humidity, pressure and ETO charge weights are primary parameters monitored on each sterilizer chamber. The LESNI APCS is monitored extensively and the principal parameters used for control are LEL sensors on the balancer and the combined catalyst bed outlet temperature. The oxidizer temperature monitoring complies with 63.363(b)(3) and 63.364(c). The temperatures are

REPORT

Sterilizer Initial Performance Test

Page 8 / 16

recorded with a data acquisition system which computes a daily 24-hour average to demonstrate compliance with the minimum temperature limit. The temperature monitors are calibrated twice per calendar year with a NIST traceable calibration. Process data collected during the initial performance test include the following:

1. Ethylene oxide used for each sterilizer cycle in pounds (see Appendix H)
2. Sterilizer cycle data including temperature, pressure, humidity, and nitrogen flow (see Appendix H)
3. Temperature at the LESNI Catalytic Oxidizer outlet (see Appendix G)
4. California Analytical Instruments – HFID data (see Appendix F)
5. LESNI Balancer Parameters (see Appendix H)
 - a. Balancer water temperature (°C)
 - b. Primary aeration exhaust pressure (mmWC)
 - c. Balancer water pressure (bar)
 - d. Ethylene glycol concentration in balancer (see Appendix H)

Since Subpart O does not include specifications for catalytic abatements systems that include a balancer, Covidien conducts alternative monitoring using a heated flame ionization detector (HFID) analyzer to monitor total hydrocarbon (THC) concentration at the oxidizer inlet.

3.4 Sterilization Cycles During Performance Test

The sterilizer chambers were operated in a manner to generate a worst case scenario of ETO emitted to the LESNI. The following table presents a time table of sterilizer events during the performance test and sterilizer recipes are provided in Appendix H.

REPORT

Sterilizer Initial Performance Test

Page 9 / 16

Table 3-1: Initial Performance Test Sterilization Process Operation

Process Step	Description	Approximate Duration (hours)
Load chambers A and B with product	Six pallets of material are loaded into each of the sterilization chambers.	NA
Chamber preparation and pre-conditioning	A leak check is performed with the chamber under vacuum. The chamber is humidified and purged with nitrogen twice.	NA
Sterilization	Ethylene oxide is added to each chamber along with a nitrogen blanket. The chamber is held in “exposure” for a pre-determined time.	NA
Sterilant removal	The contents of each chamber, including ethylene oxide, are exhausted to the LESNI APSCS.	NA
Nitrogen and air washes	Both chambers are purged with nitrogen and air. Each wash is exhausted to the LESNI APSCS.	NA
Primary aeration	Sterilized material is moved into the primary aeration rooms A and B and catox inlet/outlet Method 25A hydrocarbon monitoring is started.	NA
Load chambers A and B	Chambers A and B will be empty	0.25
Chamber preparation and pre-conditioning	A leak check is performed with the chamber under vacuum. The chamber is humidified and purged with nitrogen twice. 50 lbs of ethylene oxide is added to both chambers along with a nitrogen blanket. An abbreviated “exposure” cycle will be run.	1.25
Sterilant removal	The contents of each chamber, including ethylene oxide, are exhausted to the LESNI APSCS.	0.5
Nitrogen and air washes	Both chambers are purged with nitrogen and air. One nitrogen wash and three air washes are completed. Each wash is exhausted to the LESNI APSCS.	2
Load chambers A and B	Chambers A and B will be empty	0.25
Chamber preparation and pre-conditioning	A leak check is performed with the chamber under vacuum. The chamber is humidified and purged with nitrogen twice. 50 lbs of ethylene oxide is added to both chambers along with a nitrogen blanket. An abbreviated “exposure” cycle will be run.	1.25
Sterilant removal	The contents of each chamber, including ethylene oxide, are exhausted to the LESNI APSCS.	0.5
Run three 1-hour chamber vent and primary aeration tests	Run three 1-hour emission tests during maximum balancer exhaust as determined by June 2015 engineering tests.	NA
Nitrogen and air washes	Both chambers are purged with nitrogen and air. One nitrogen wash and three air washes are completed. Each wash is exhausted to the LESNI APSCS.	2
Secondary Aeration	Transfer sterilized material from primary aeration rooms A and B to secondary aeration	NA
Run three 1-hour secondary aeration tests	Run three 1-hour tests while product is stored in secondary aeration.	NA

REPORT

Sterilizer Initial Performance Test

Page 10 / 16

4 SAMPLING & ANALYTICAL PROCEDURES

ETO mass flow rates were measured concurrently at the oxidizer inlet and outlet and destruction efficiency was demonstrated on a mass basis. The tables and paragraphs below describe the reference methods and detailed method descriptions are contained in Appendix I.

Table 4-1: Reference Methods

Method	Description
EPA 1	Sample and Velocity Traverses for Stationary Sources
EPA 2	Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
EPA 3	Gas Analysis for the Determination of Dry Molecular Weight
EPA 3a	Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)
EPA 4 ¹	Determination of Moisture Content in Stack Gases
EPA 18	Measurement of Gaseous Organic Compound Emissions by Gas Chromatography
EPA 25A	Determination of Total Gaseous Organic Concentration Using a Flame Ionization Detector Analyzer

1. Method 4 was only used to measure moisture at the oxidizer exit. The oxidizer inlet and secondary aeration gas is indoor ambient air and moisture was determined from a wet bulb-dry bulb temperature measurement.

Table 4-2: Instrumental Reference Method Analyzers

Constituent	Analyzer	Detector	Span ¹
O ₂	TAPI T200H	Paramagnetic	22%
CO ₂	TAPI T300M	Non-Dispersive Infrared	18%
total hydrocarbons	VIG Model 20	flame ionization	25 ppm 5000 ppm
ETO	SRI 8610c	Flame Ionization	10 ppm 2000 ppm

1. Outlet and inlet ranges are listed for total hydrocarbons and ETO.

REPORT

Sterilizer Initial Performance Test

Page 11 / 16

4.1 ETO Emission Concentration – EPA Methods 18 and 25A

ETO emission concentrations were measured in accordance with EPA Method 18 using Tedlar bag sampling and on-site GC/FID analysis. Figure 4-1 shows the Method 18 Tedlar bag sampling system. The Tedlar bags are placed in a rigid sealed container and the bag valves are connected to a ¼-inch OD stainless steel probe with FEP Teflon tubing. Air is pumped from the container at a constant rate of approximately 100 ml/minute and sample gas enters the bag through the probe and Teflon tubing at the same rate. This sampling method allows sample to be collected without the sample gas contacting the pump and minimizes the potential for contamination or leakage. The Tedlar bags are 12”x18” and hold approximately 10 liters of gas. Each bag is equipped with a plastic needle valve and the valve is attached to a ¼” Teflon sample probe with a 1”length of 3/16” ID silicon rubber tubing. Tedlar bag samples are analyzed for ETO by gas chromatography/flame ionization detector (GC/FID) within 2 hours of collection. Each sample was analyzed in triplicate. In addition, a recovery study was conducted at both the inlet and outlet ranges in accordance with EPA Method 18.

The GC/FID analyses was performed on an SRI 8610C gas chromatograph equipped with a 60 meter MXT-1 column. Sample gas is pumped through a 1-foot length of 1/8” Teflon tubing, and a heated gas-sampling valve. The sample flow rate through the loading system is approximately 400 cc/minute. The column temperature is operated isothermally at 60 °C. The chromatograph is equipped with a computer based data acquisition and the system is initially calibrated with four levels of ETO including zero, low, mid, and high certified calibration gases. The outlet analyzer was calibrated on a 10 ppm range and the inlet analyzer was calibrated on a 2000 ppm range. The calibration gases were purchased from a certified gas supplier with a 2% accuracy for gases above 5 ppm and 5% accuracy for gases below 5 ppm. The calibration gas concentrations are listed in the following table.

Table 4-3: Method 18 ETO Calibration Gas Concentrations (ppm)

Sampling Location	Low	Mid	High
Oxidizer Inlet	98.9	1000	2000
Oxidizer Outlet and Secondary Aeration	1.00	5.00	10.0

REPORT

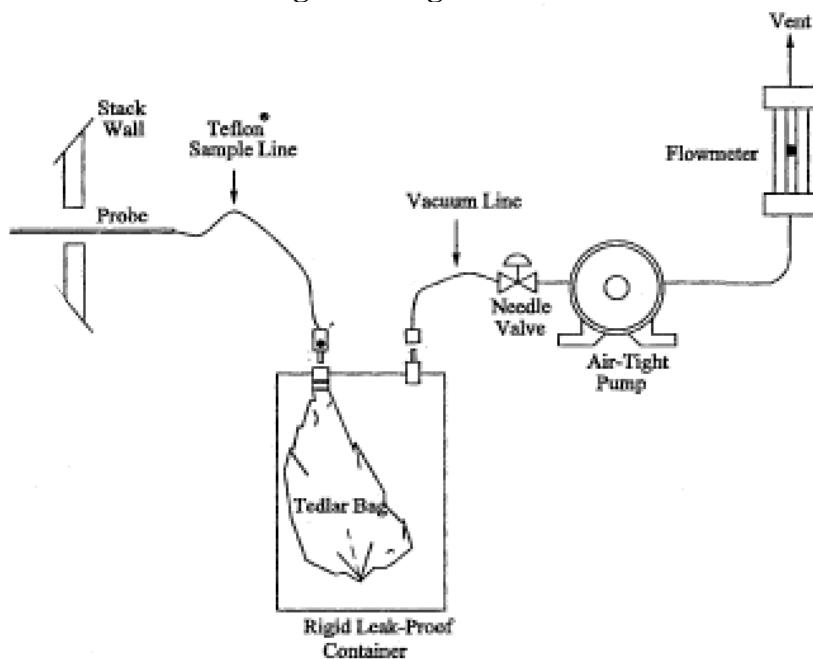
Sterilizer Initial Performance Test

Page 12 / 16

The Method 18 detection limit on the low range calibration (10 ppm) was 0.05 ppm. The limit was determined by analyzing the low standard (1.00 ppm) seven times in accordance with a standard statistical analysis as described in the protocol.

Total hydrocarbons were measured concurrently with each Method 18 test on the oxidizer inlet and outlet in accordance with EPA Method 18. The inlet analyzer will be operated on a 0-5000 ppm methane scale and the outlet was operated on a 0-25 ppm scale. The outlet measurements were not a valid indicator of ETO emission concentration because of small quantities of methane emissions from the natural gas burners.

**Figure 4-1
Integrated Bag Schematic**



4.2 Gas Flow Rate and Molecular Weight

Exhaust gas velocity pressure was measured according to EPA Methods 1 and 2. An s-type pitot and manometer were used to measure velocity pressure at all sampling locations. One flow traverse was conducted before and after each 1-hour test run on the oxidizer using the sampling points shown in Figures 4-2 and Figure 4-3; secondary aeration exhaust traverse points are shown in Figure 4-4.

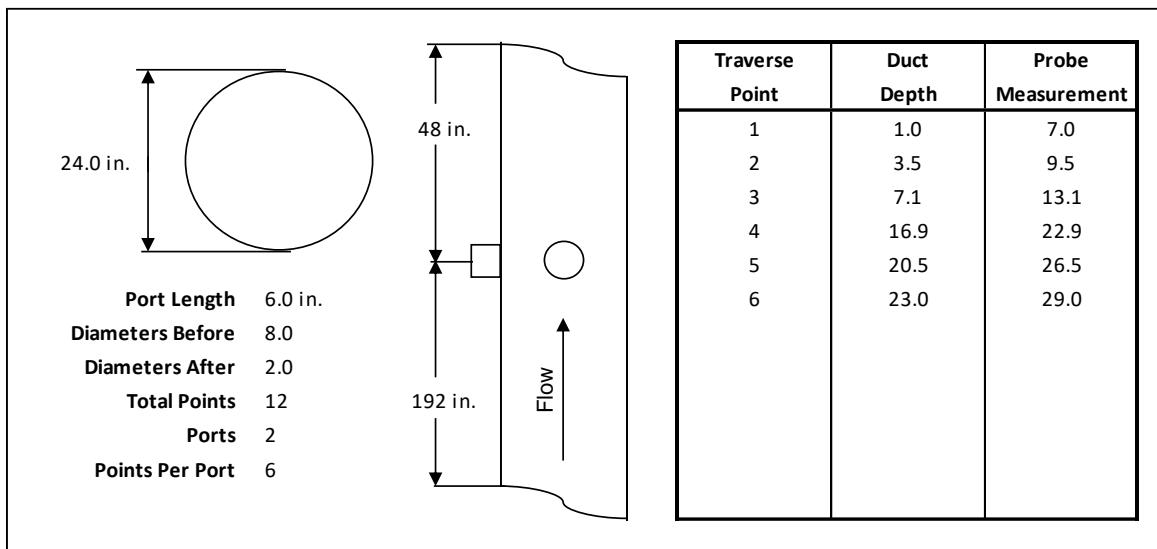
REPORT

Sterilizer Initial Performance Test

Page 13 / 16

Gas molecular weight was determined on the oxidizer stack in accordance with EPA Methods 3a and 4. Detailed method descriptions are contained in Appendix I. Gas molecular weight at the oxidizer inlet and the secondary aeration stack were based on ambient air (20.9% O₂) and moisture concentration measured using a wet bulb-dry bulb temperature measurement.

Figure 4-2: Inlet Traverse Points



REPORT

Sterilizer Initial Performance Test

Page 14 / 16

Figure 4-3: Outlet Traverse Points

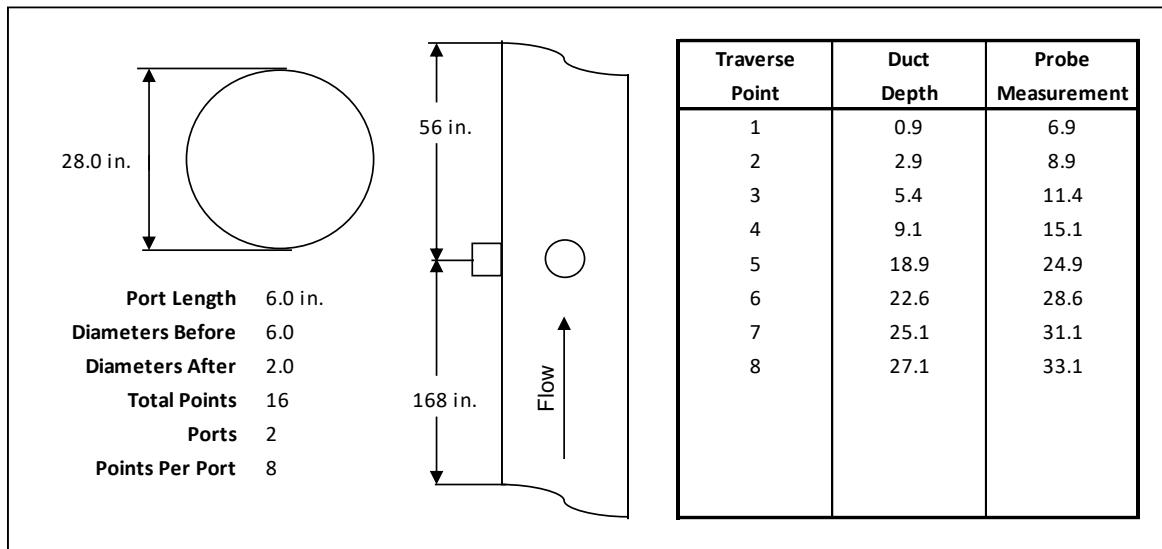
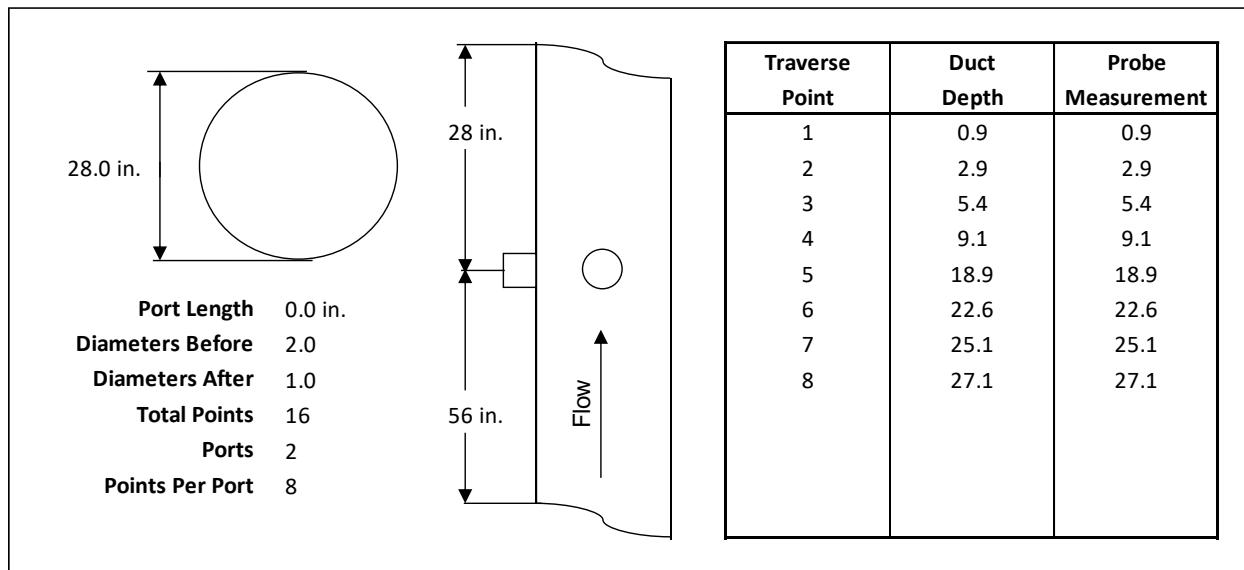


Figure 4-4: Secondary Aeration Traverse Points



4.3 Test Method Deviations

The LESNI APCS differs from the control systems described in Subpart O and the test strategy (ie, coordination of emission testing, chamber venting and primary aeration) was modified to accommodate these differences. These modifications were described in detail in the test protocol and those procedures were followed during the test.

5 QUALITY ASSURANCE

CM's quality assurance program is designed so that work is performed by competent, experienced individuals using properly calibrated equipment, approved procedures for sample collection, recovery, and analysis and proper documentation. This ensures the integrity of data collected, processed, and reported on each project.

5.1 Sampling and Flow Equipment

Sampling and measurement equipment, including continuous analyzers, recorders, pitot tubes, dry-gas meters, orifice meters, thermocouples, probes, nozzles, and any other pertinent apparatus, is uniquely identified, undergoes preventive maintenance, and is calibrated before and after each field effort, following written procedures and acceptance criteria. Calibrations are performed with standards traceable to the National Institute for Science and Technology (NIST) when required. Standards used include wet-test meters, standard pitot tubes, and NIST Standard Reference Materials. Records of all calibration data are maintained in CM files.

5.2 EPA Method 18

Sampling and analytical quality control for EPA Method 18 include sampling flow rate calibration, leak checking before each test, bag wall loss recovery study, triplicate analyses, pre-analysis multi-level calibration and a post-analysis single-level calibration. In addition, any dilutions made on samples or calibration gases will be verified by the testing firm. The Teflon tube used for sampling transfer lines will be new, steel probes will be new, and dedicated inlet/outlet equipment will be used. The sampling trains will be leak checked before each test run using a flow leak check procedure. The sampling probe inlet will be sealed and the sampling train will be evacuated to a vacuum greater than 5 inches of Hg. An acceptable leak rate is no observed flow over a 30 second period.

The calibration precision is measured during the initial calibration by analyzing each calibration gas three times and each of the three runs was within 5% of the mean. Bag wall loss will be determined by spiking one of the samples with a known amount of ETO and then re-analyzing the spiked sample. The spike recovery is calculated in accordance with EPA Method 18 and recovery must be $\pm 30\%$.

REPORT

Sterilizer Initial Performance Test

Page 16 / 16

Additional Method 18 QA will include a detection limit determination conducted in accordance with 40 CFR 60.136. This procedure involves analyzing the low standard 7 times and calculating the detection limit based on the standard deviation.

APPENDIX A

OXIDIZER OUTLET EMISSIONS TEST DATA

Covidien - North Haven, CT
Oxidizer Outlet (24-inch stack)

EPA 1, 2, 3A, 4, 18
Summary Table

Canomara LLC
Source Testing Services

Item	Description	Run 1	Run 2	Run 3	Average	Compliance
Date	Test Date	8/10/2016	8/10/2016	8/10/2016		
Start	Run Start Time	15:22	16:54	18:50		
Finish	Run Finish Time	16:22	17:54	19:50		
θ	Net Run Time, minutes	64.0	64.0	64.0	64.0	
N_{tp}	Net Traversing Points	16	16	16	16	
C_p	Pitot Tube Coeficient	0.840	0.840	0.840	0.840	
Y	Dry Gas Meter Calibration Factor	0.999	0.999	0.999	0.999	
$\Delta H_{@}$	Dry Gas Meter Orifice Constant	1.799	1.799	1.799	1.799	
P_{Br}	Barometric Pressure, inches of Mercury	30.11	30.11	30.11	30.11	
ΔH	Average orifice meter Differential, inches H_2O	1.80	1.80	1.80	1.80	
V_m	Dry Gas Meter Volume Sampled, cubic feet	42.591	44.346	45.410	44.116	
t_m	Average Dry Gas Meter Temperature, °F	84.6	89.3	89.5	87.8	
V_{mstd}	Dry Gas Meter Volume Sampled, dscf	41.697	43.040	44.059	42.932	
V_{lc}	Total Moisture Liquid collected, ml	44	32	25	34	
V_{wstd}	Volume of Water Vapor, standard cubic feet	2.07	1.51	1.18	1.58	
% H_2O	Moisture Content of Stack Gas, %	4.7	3.4	2.6	3.6	
M_{fd}	Dry Mole Fraction	0.953	0.966	0.974	0.964	
%CO ₂	Carbon Dioxide, %	0.00	0.00	0.00		
%O ₂	Oxygen, %	20.54	20.61	20.62	20.59	
% CO + N ₂	Carbon Monoxide & Nitrogen, %	79.5	79.4	79.4	79.4	
M_d	Dry Molecular Weight, lb/lb-Mole	28.82	28.82	28.82	28.82	
M_s	Wet Molecular Weight, lb/lb-Mole	28.31	28.46	28.54	28.44	
P_g	Flue Gas Static Pressure, inches of H_2O	-0.18	-0.17	-0.18	-0.18	
P_s	Absolute Flue Gas Pressure, inches of Mercury	30.10	30.10	30.10	30.10	
T_s	Average Stack Gas Temperature, °F	142.9	151.8	148.1	147.6	
ΔP_{avg}	Average Velocity Head, inches of H_2O	0.241	0.264	0.278	0.261	
A_s	Stack Crossectional Area, square feet	4.3	4.3	4.3	4.3	
FLOW						
V_s	Average Stack Gas Velocity, fps	29.6	31.1	31.8	30.8	
V_s (fpm)	Average Stack Gas Velocity, fpm	1,775	1,867	1,907	1,850	
Q_{aw}	Actual Wet Volumetric Flue Gas Flow Rate, acfm	7,590	7,984	8,155	7,910	
Q_{sw}	Standard Wet Volumetric Flue Gas Flow Rate, scfm	6,687	6,932	7,122	6,914	
Q_{sw} (scfh)	Standard Wet Volumetric Flue Gas Flow Rate, scfh	401,196	415,929	427,335	414,820	
Q_{sd}	Standard Dry Volumetric Flow Rate, dscfm	6,370	6,698	6,937	6,668	
Q_{sd} (dscfh)	Standard Dry Volumetric Flow Rate, dscfh	382,215	401,868	416,221	400,101	
ETHYLENE OXIDE						
EO _{ppm-outlet}	Ethylene Oxide Concentration, ppm-wet	0.05	0.05	0.05	0.05	
EO _{lb/hour-outlet}	Ethylene Oxide Emission Rate, lb/hour	0.0023	0.0024	0.0024	0.0024	
EO _{lb/hour-inlet}	Ethylene Oxide Inlet Emission Rate, lb/hour	22.82	33.07	28.21	28.03	
Control Efficiency	Percent Control Efficiency (%)	99.990%	99.993%	99.991%	99.991%	

Oxidizer Outlet Method 18 Summary**10-Aug-16****Covidien****Run 1**

Compound	Concentration (ppm)				Deviation			Recovery	Corrected (ppm)
	1	2	3	Average					
EO	<0.048	<0.048	<0.048	<0.048	0.0%	0.0%	0.0%	1.07	<0.05

Run 2

Compound	Concentration (ppm)				Deviation			Recovery	Corrected (ppm)
	1	2	3	Average					
EO	<0.048	<0.048	<0.048	<0.048	0.0%	0.0%	0.0%	1.07	<0.05

Run 3

Compound	Concentration (ppm)				Deviation			Recovery	Corrected (ppm)
	1	2	3	Average					
EO	<0.048	<0.048	<0.048	<0.048	0.0%	0.0%	0.0%	1.07	<0.05

Oxidizer Outlet Method 18 Initial Calibration**10-Aug-16****Covidien****Standards**

	Low	Mid		High
Cylinder ID	EA0011747	EA0011733		EA0077506
Expiration Date	5/21/2017	5/21/2017		5/21/2017
EO (ppm)	1.0	5.00		10.0

High

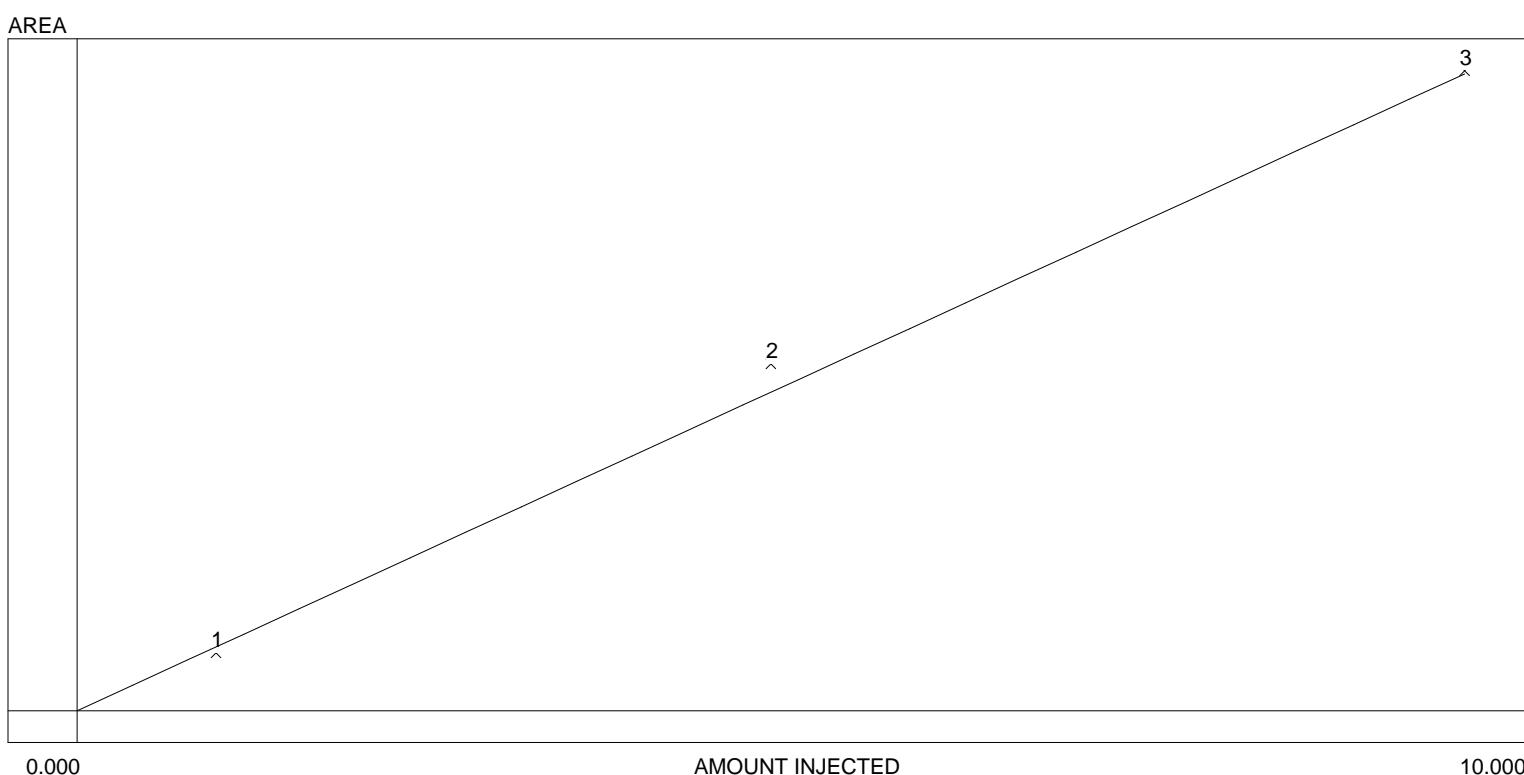
Compound	Conc	Injection									Average	
		20			21			22				
		Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc
EO	10.00	29.03	10.07	-0.21%	29.01	10.06	-0.17%	28.85	10.01	0.38%	28.97	10.05

Mid

Compound	Conc	Injection									Average	
		17			18			19				
		Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc
EO	5.00	15.76	5.47	-0.42%	15.61	5.41	0.54%	15.72	5.45	-0.13%	15.70	5.44

Low

Compound	Conc	Injection									Average	
		10			11			12				
		Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc
EO	1.00	2.67	0.92	-1.96%	2.58	0.89	1.48%	2.60	0.90	0.47%	2.61	0.91



Avg slope of curve: 2.88

Y-axis intercept: 0.00

Linearity: 1.00

Number of levels: 3

SD/rel SD of CF's: 0.3/9.1

Y=2.8831X

r2: 0.9964

Last calibrated: Wed Aug 10 10:29:53 2016

Lvl.	Area/ht.	Amount	CF	Current	Previous #1	Previous #2
1	2.614	1.000	2.614	2.665	2.575	2.601
2	15.695	5.000	3.139	15.761	15.610	15.715
3	28.965	10.000	2.897	29.028	29.015	28.854

Oxidizer Outlet Method 18 Recovery Study Summary**10-Aug-16****EPA Method 18****Covidien****Recovery Summary**

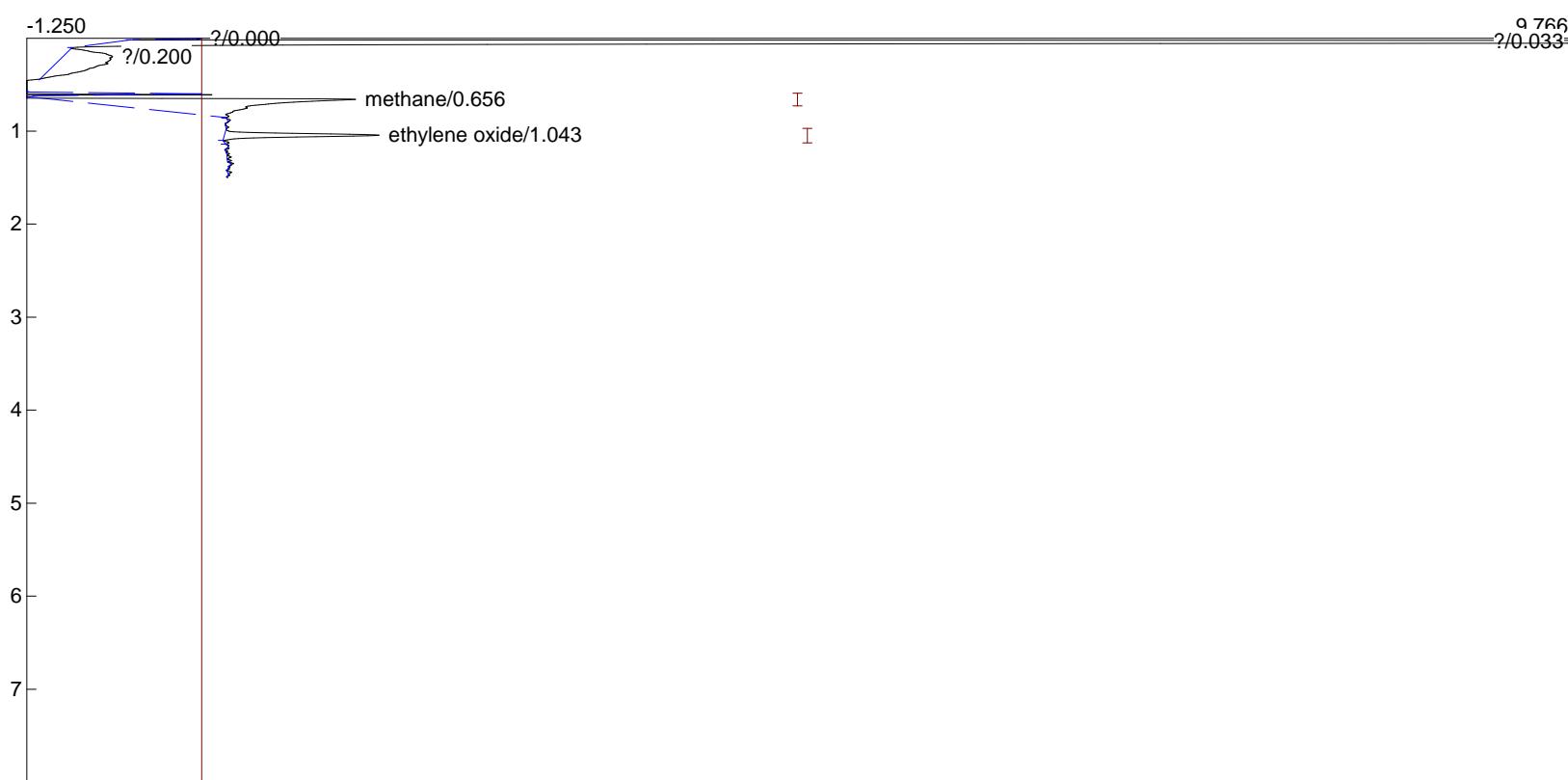
Compound	Sample ID	Sample Volume (ml)	(u) Un-Spiked Sample Response (ppm)	Sample Mass	Standard Volume (ml)	Standard Conc (ppm)	Standard Mass	Spiked Bag Total Conc (ppm)	(s) Theoretical Spike Conc (ppm)	(t) Spiked Sample Response (ppm)	(t-u)/s Recovery (%)
EO	1	6435	0.0	309	300	98.9	29670	4.45	4.40	4.74	107%

Spiked Sample Analysis

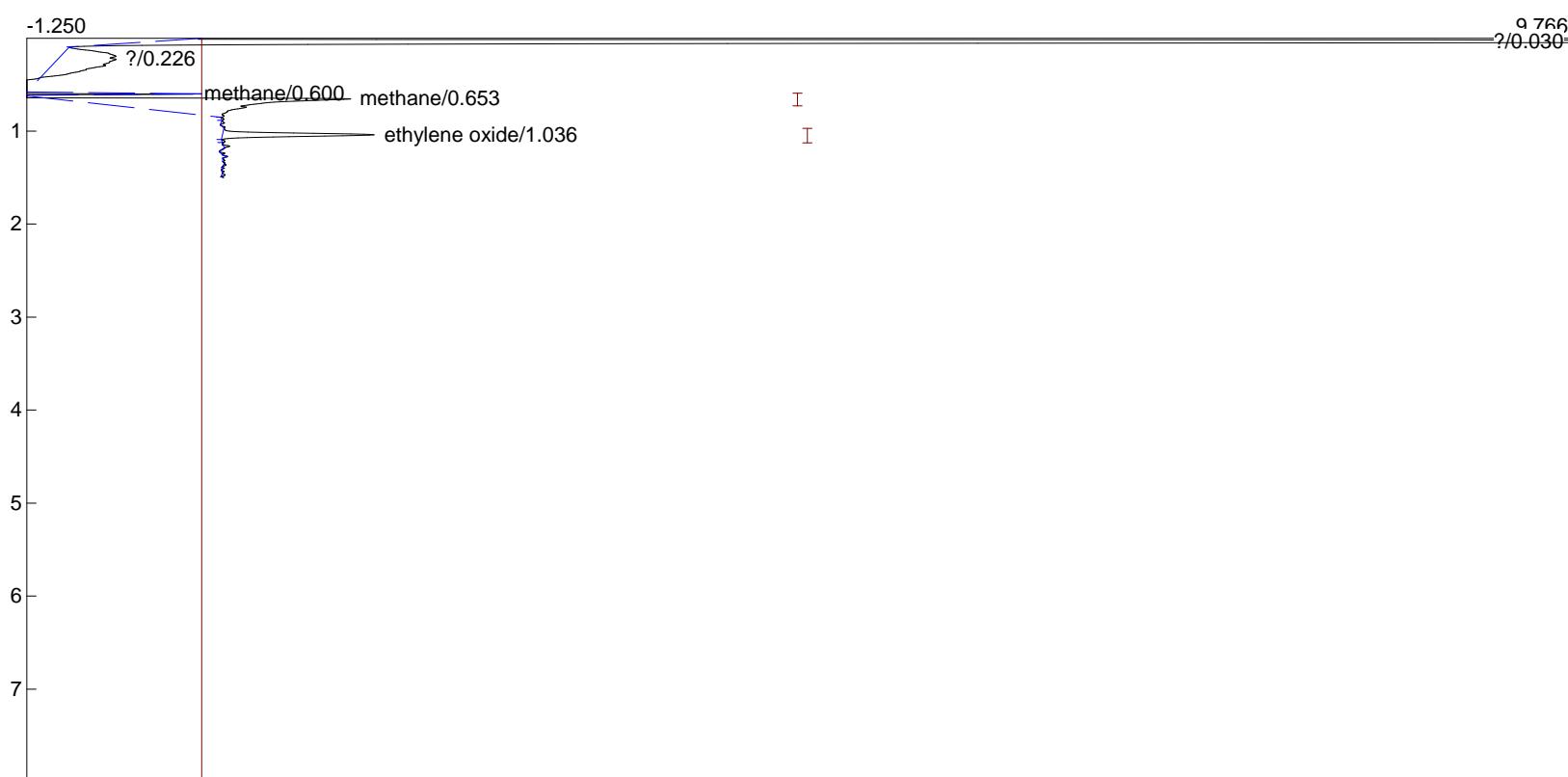
Compound	Concentration (ppm)				Deviation		
	1	2	3	average (t)			
EO	4.7580	4.7047	4.7548	4.7392	-0.4%	0.7%	-0.3%

Oxidizer Outlet Method 18 Post Test Calibration**10-Aug-16****Covidien****Mid Post Cal**

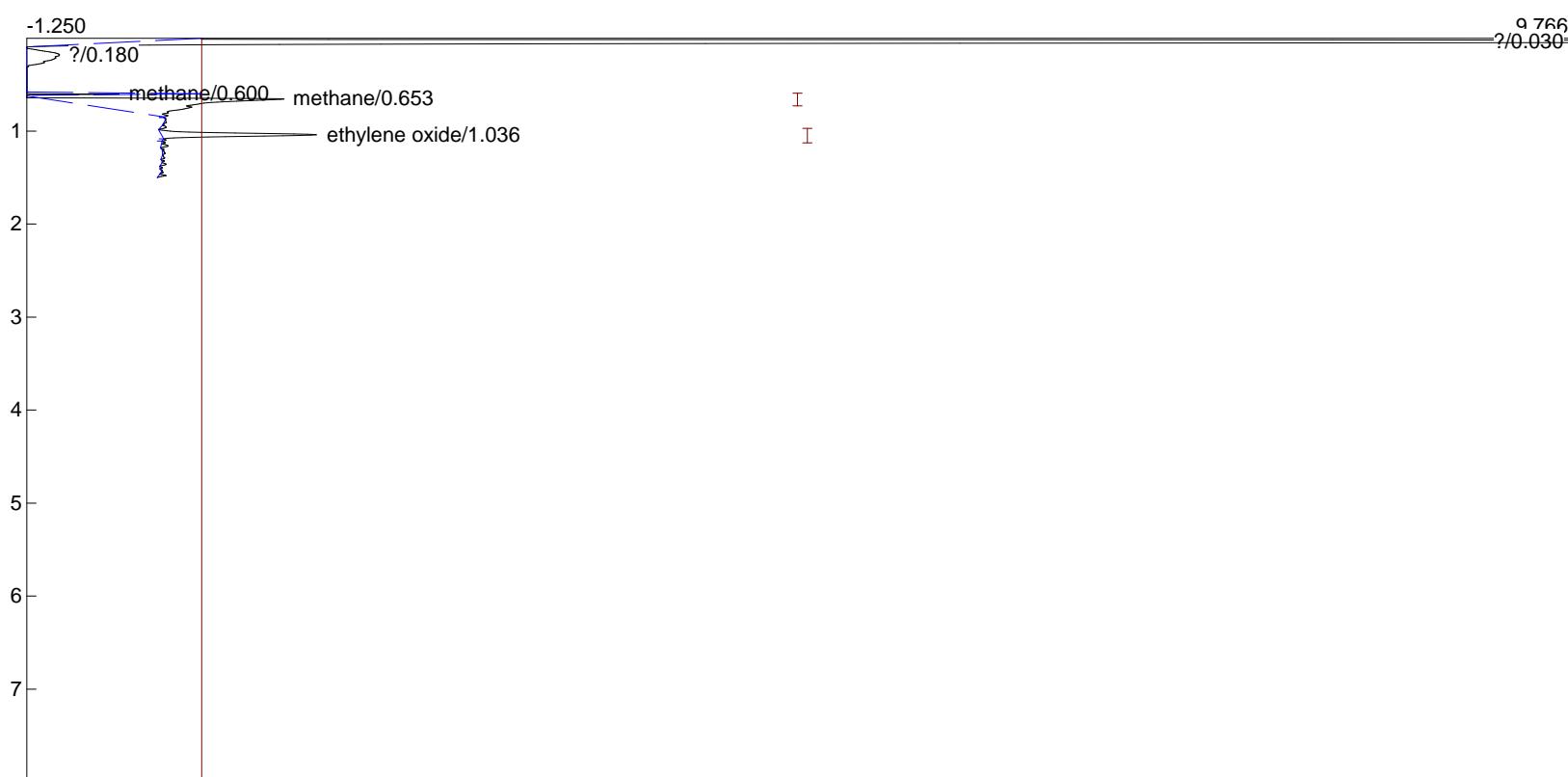
Compound	Conc	Injection										Average		Accuracy	Drift		
		1			2			3									
		Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc					
EO	5.00	15.6555	5.43	0.0%	15.7274	5.4549	-0.5%	15.5876	5.4065	0.4%	15.66	5.43	8.61	-0.25%			



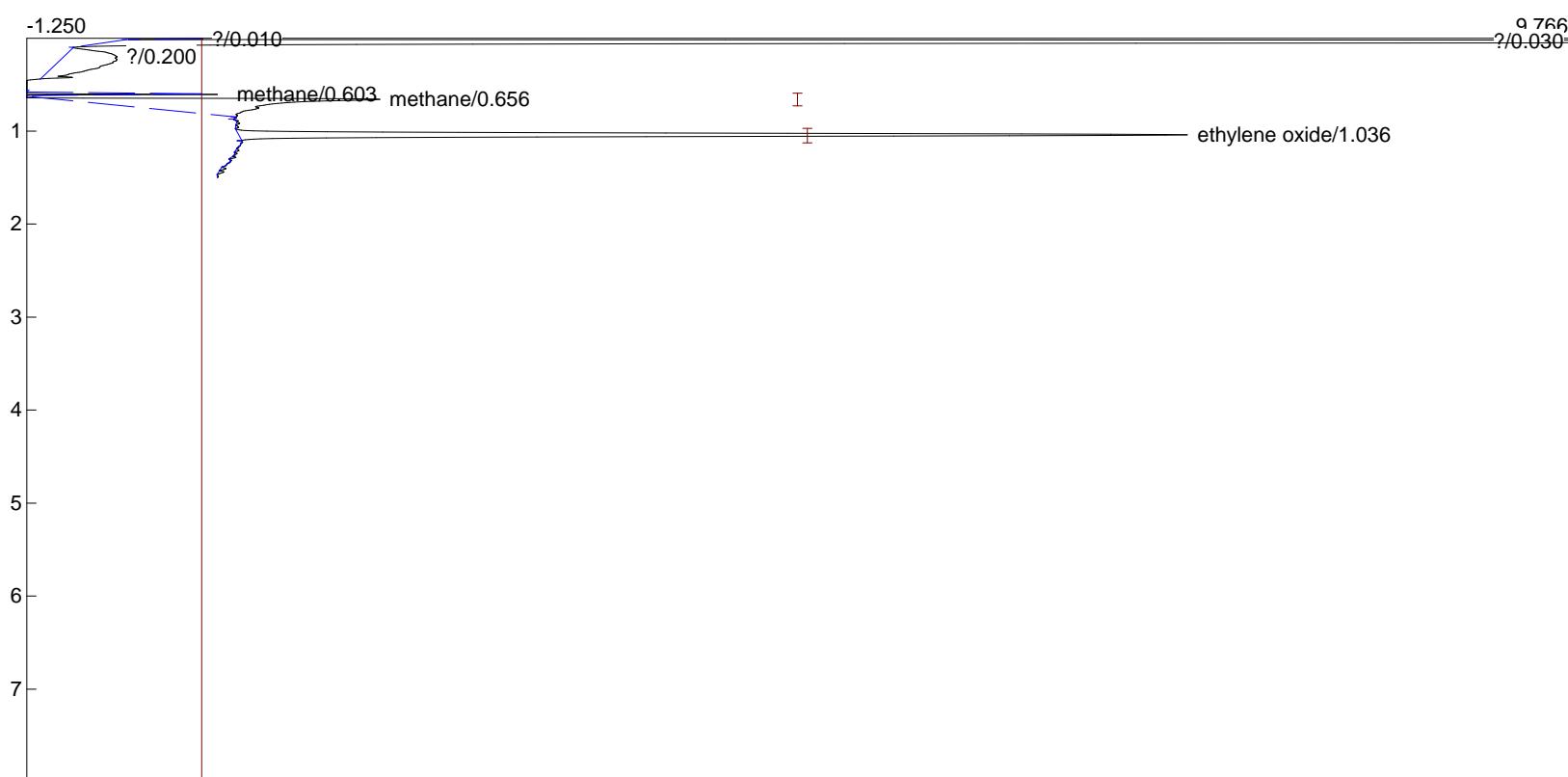
Component	Retention	Area	Height	External	Units
methane	0.656	79.3368	12.101	26.2627	
ethylene oxide	1.043	2.6650	1.108	0.9243	
		82.0018		27.1871	



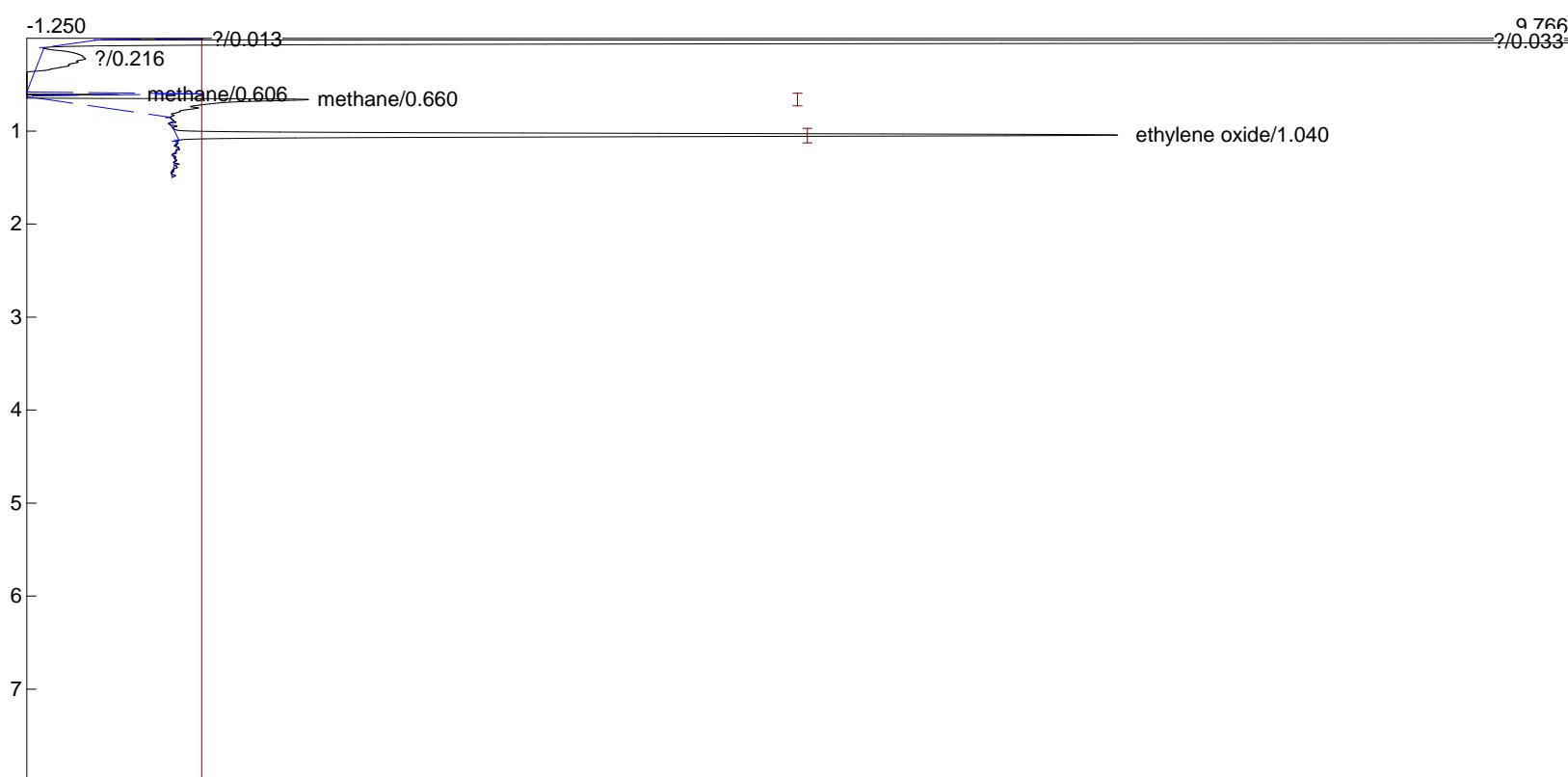
Component	Retention	Area	Height	External	Units
methane	0.600	2.4626	N/D	0.8152	
methane	0.653	80.0904	12.059	26.5122	
ethylene oxide	1.036	2.5750	1.089	0.8931	
		85.1280		28.2205	



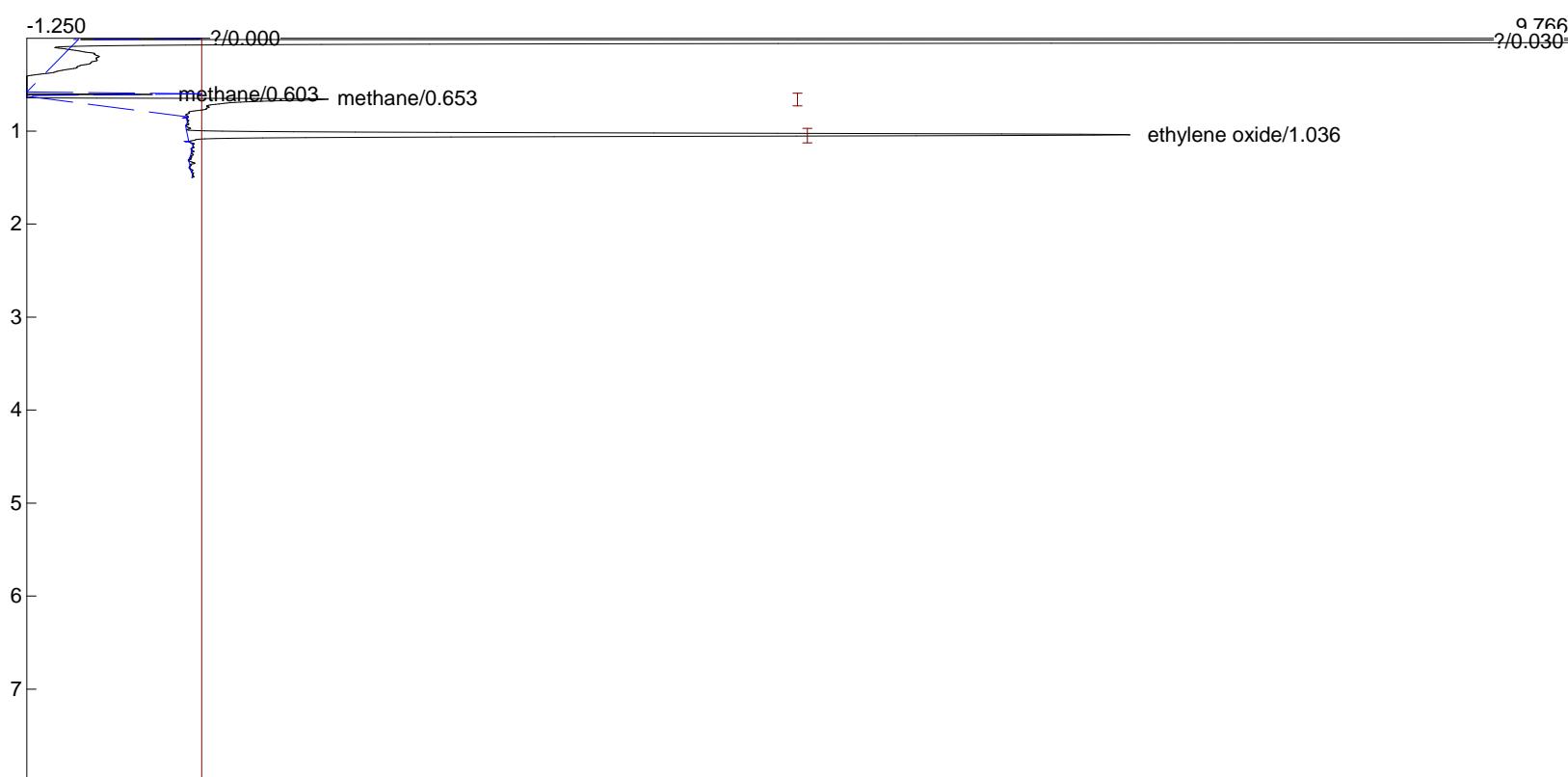
Component	Retention	Area	Height	External	Units
methane	0.600	2.2239	N/D	0.7362	
methane	0.653	78.3782	11.954	25.9454	
ethylene oxide	1.036	2.6014	1.117	0.9023	
		83.2035			27.5839



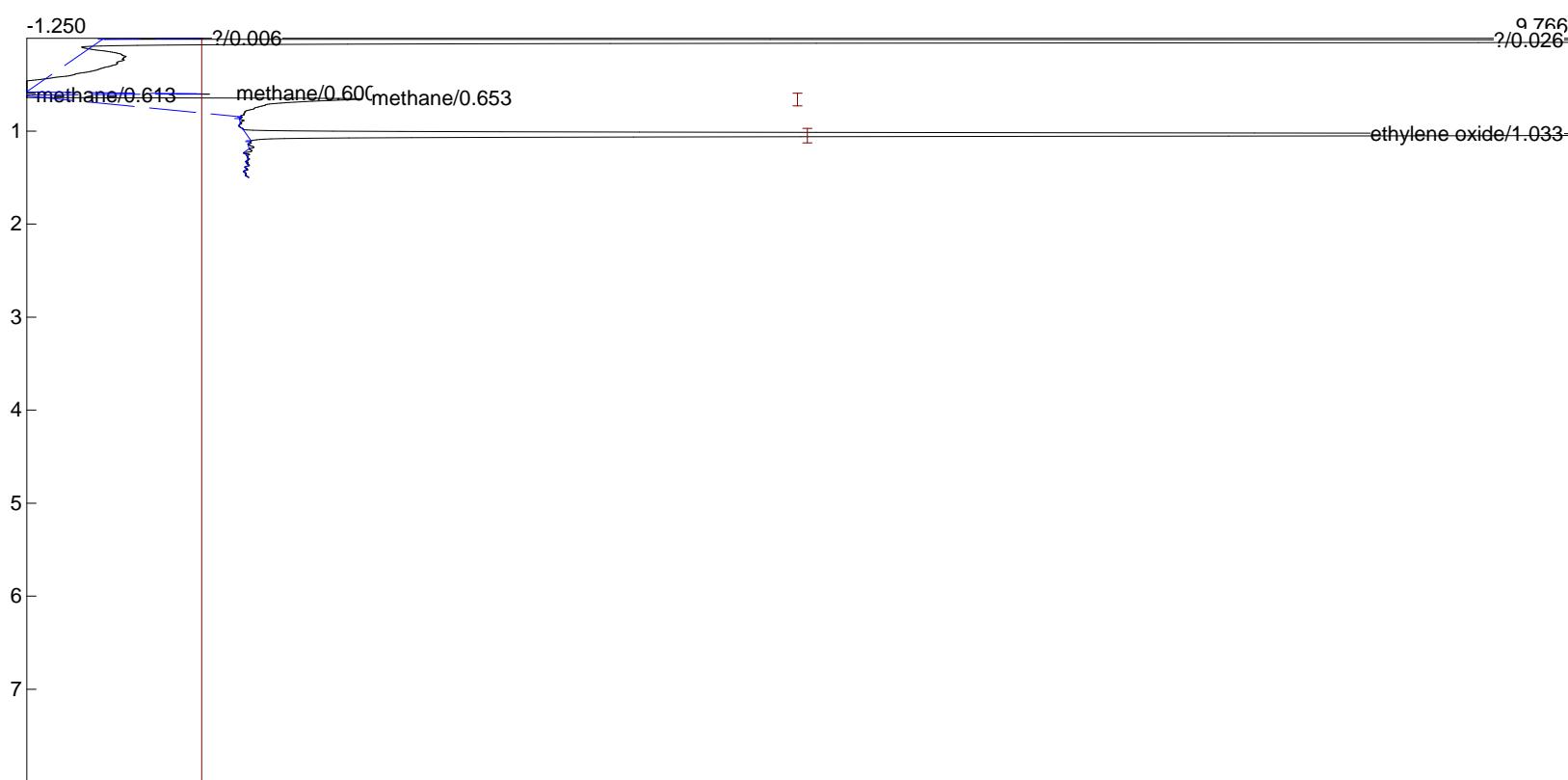
Component	Retention	Area	Height	External	Units
methane	0.603	3.3178	2.126	1.0983	
methane	0.656	80.5032	12.426	26.6489	
ethylene oxide	1.036	15.7610	6.785	5.4666	
			99.5820	33.2137	



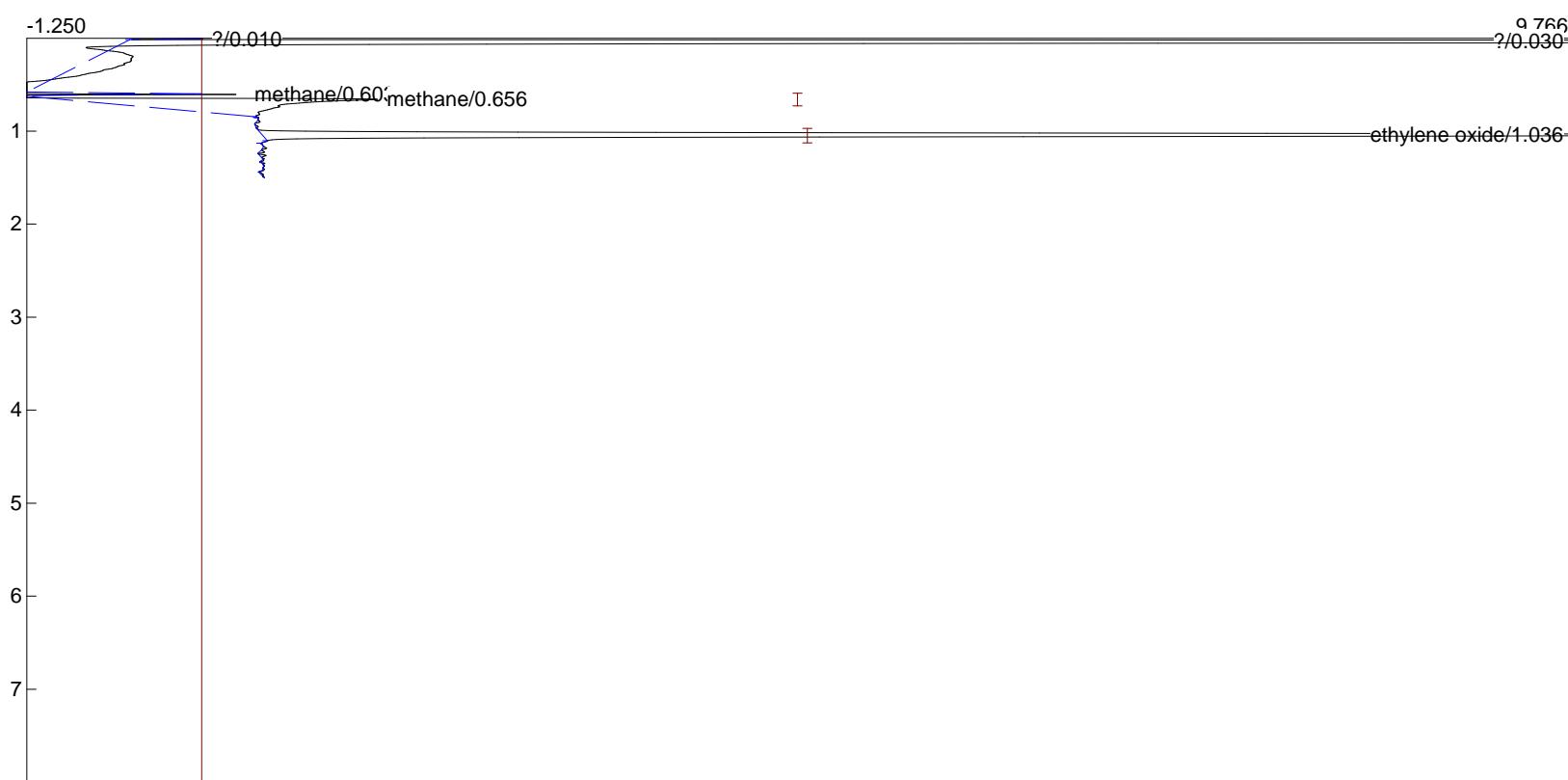
Component	Retention	Area	Height	External	Units
methane	0.606	3.4486	3.166	1.1416	
methane	0.660	80.4922	12.253	26.6452	
ethylene oxide	1.040	15.6100	6.788	5.4142	
			99.5508	33.2010	



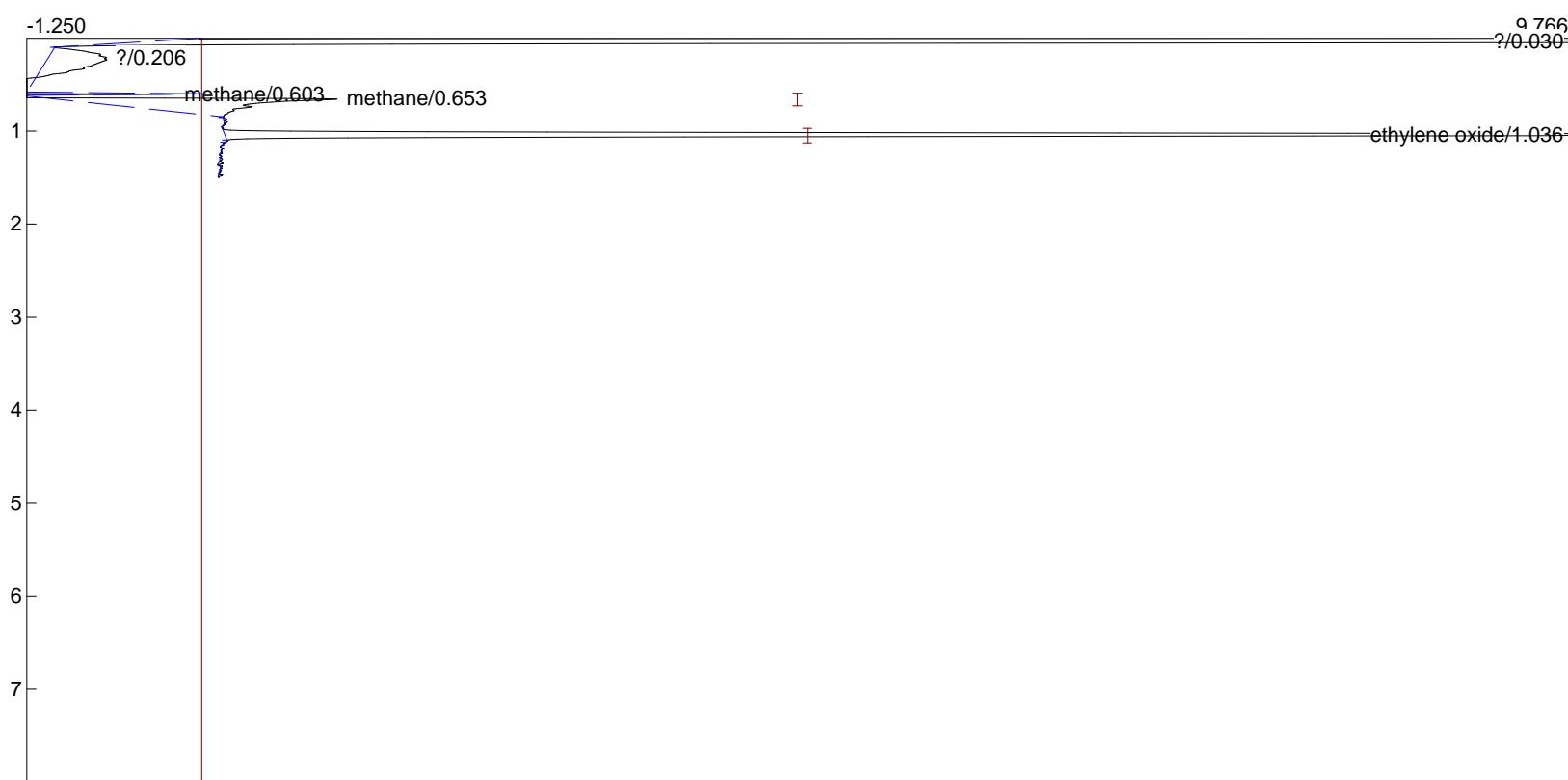
Component	Retention	Area	Height	External	Units
methane	0.603	2.8196	1.859	0.9334	
methane	0.653	81.3760	12.675	26.9378	
ethylene oxide	1.036	15.7154	6.795	5.4508	
		99.9110			33.3219



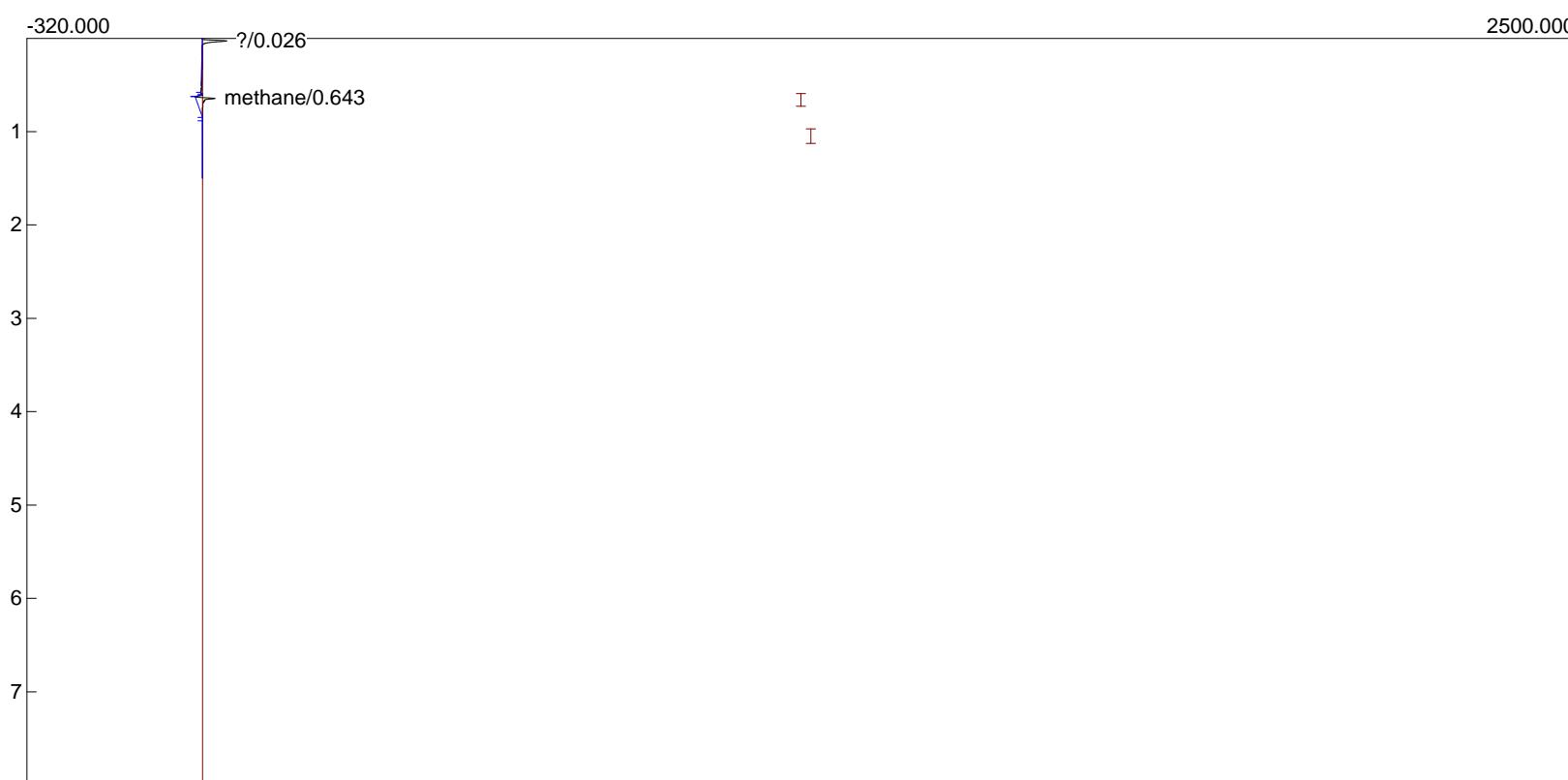
Component	Retention	Area	Height	External	Units
methane	0.600	1.8398	0.181	0.6090	
methane	0.613	0.2109	0.000	0.0698	
methane	0.653	81.7676	12.255	27.0674	
ethylene oxide	1.033	29.0275	12.561	10.0680	
		112.8458		37.8142	



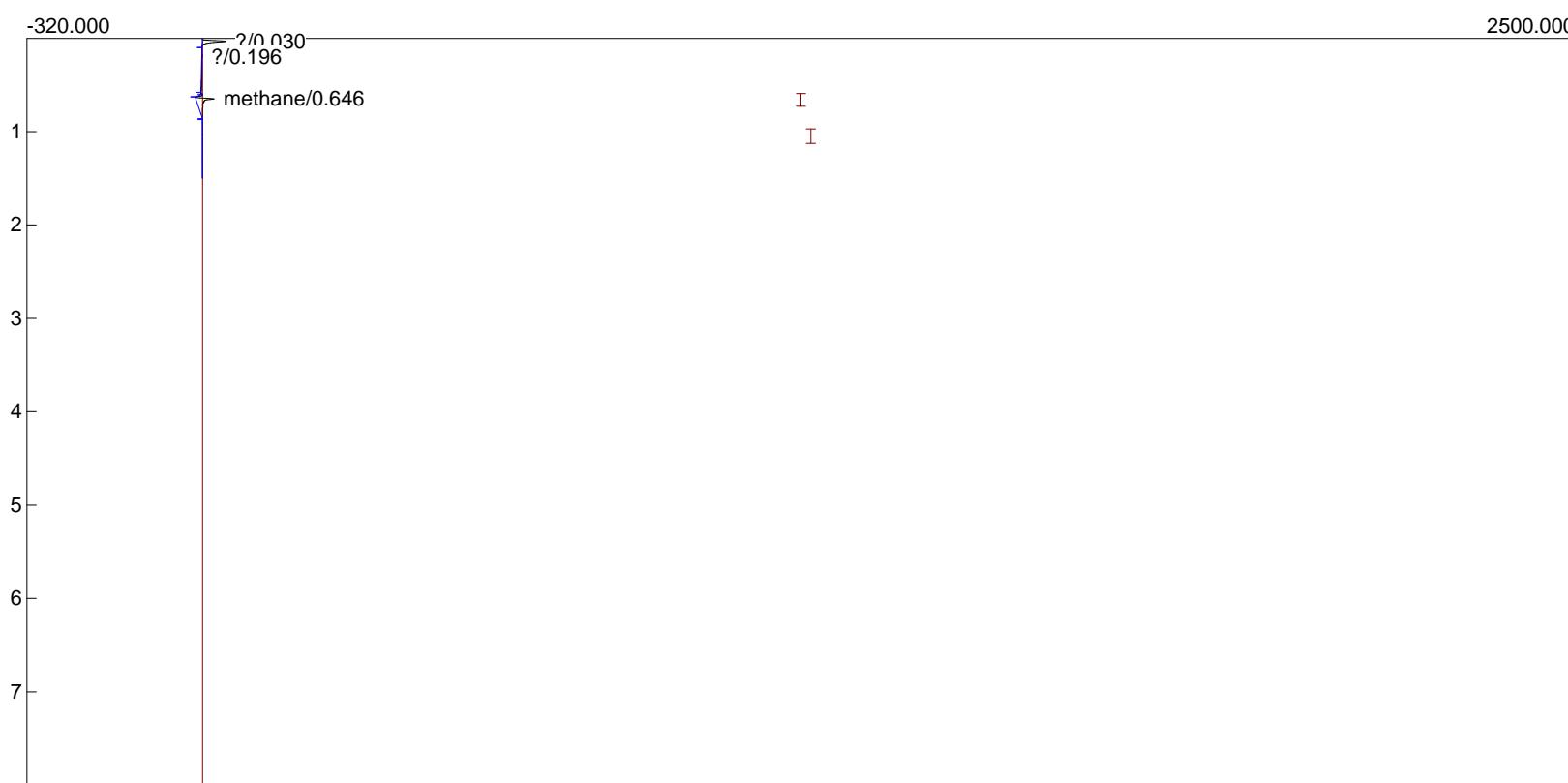
Component	Retention	Area	Height	External	Units
methane	0.603	3.4498	2.239	1.1420	
methane	0.656	80.6388	12.375	26.6937	
ethylene oxide	1.036	29.0148	12.571	10.0636	
		113.1034			37.8993



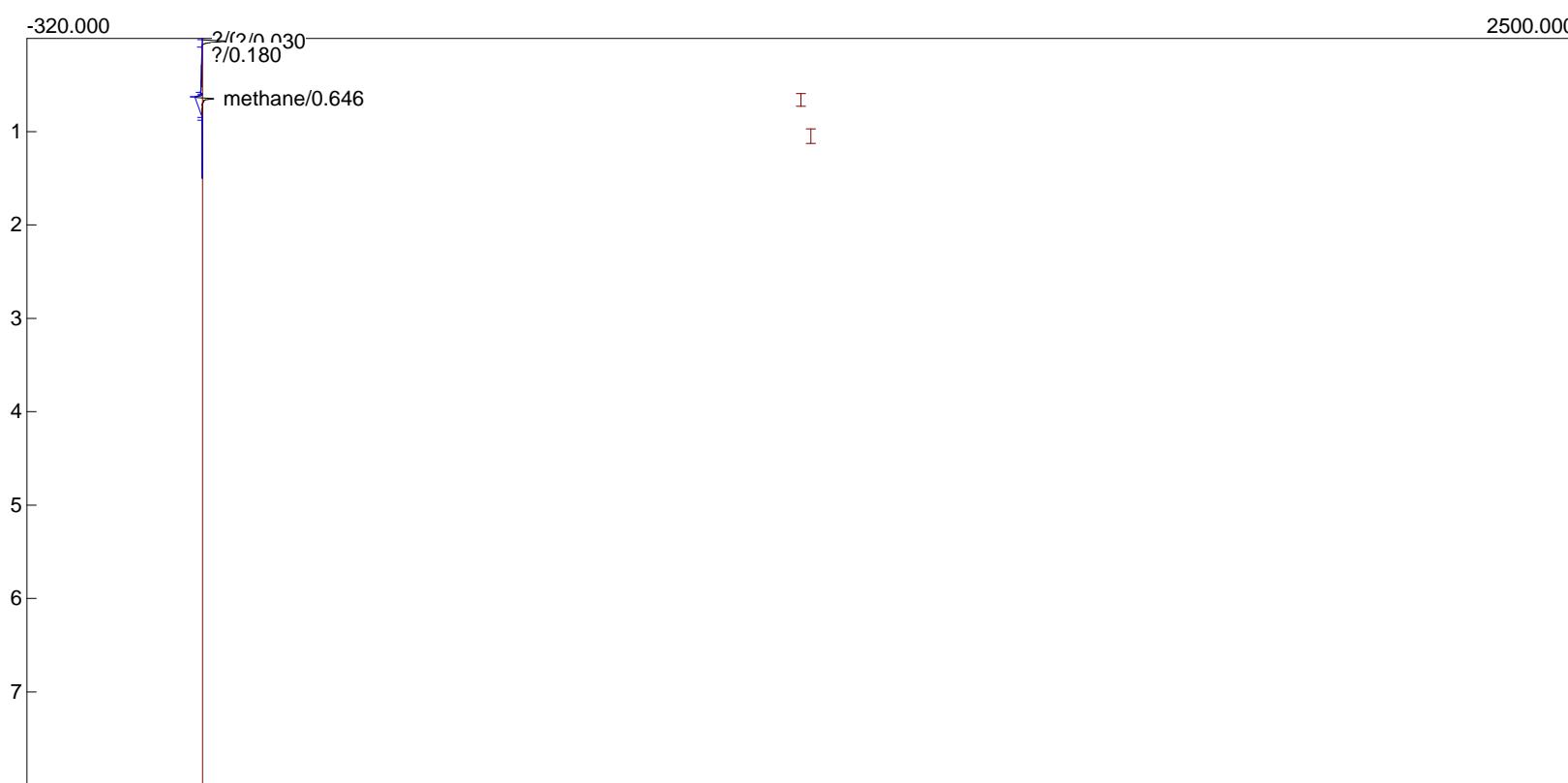
Component	Retention	Area	Height	External	Units
methane	0.603	2.5078	1.961	0.8302	
methane	0.653	79.8153	12.218	26.4211	
ethylene oxide	1.036	28.8540	12.569	10.0078	
		111.1771		37.2591	



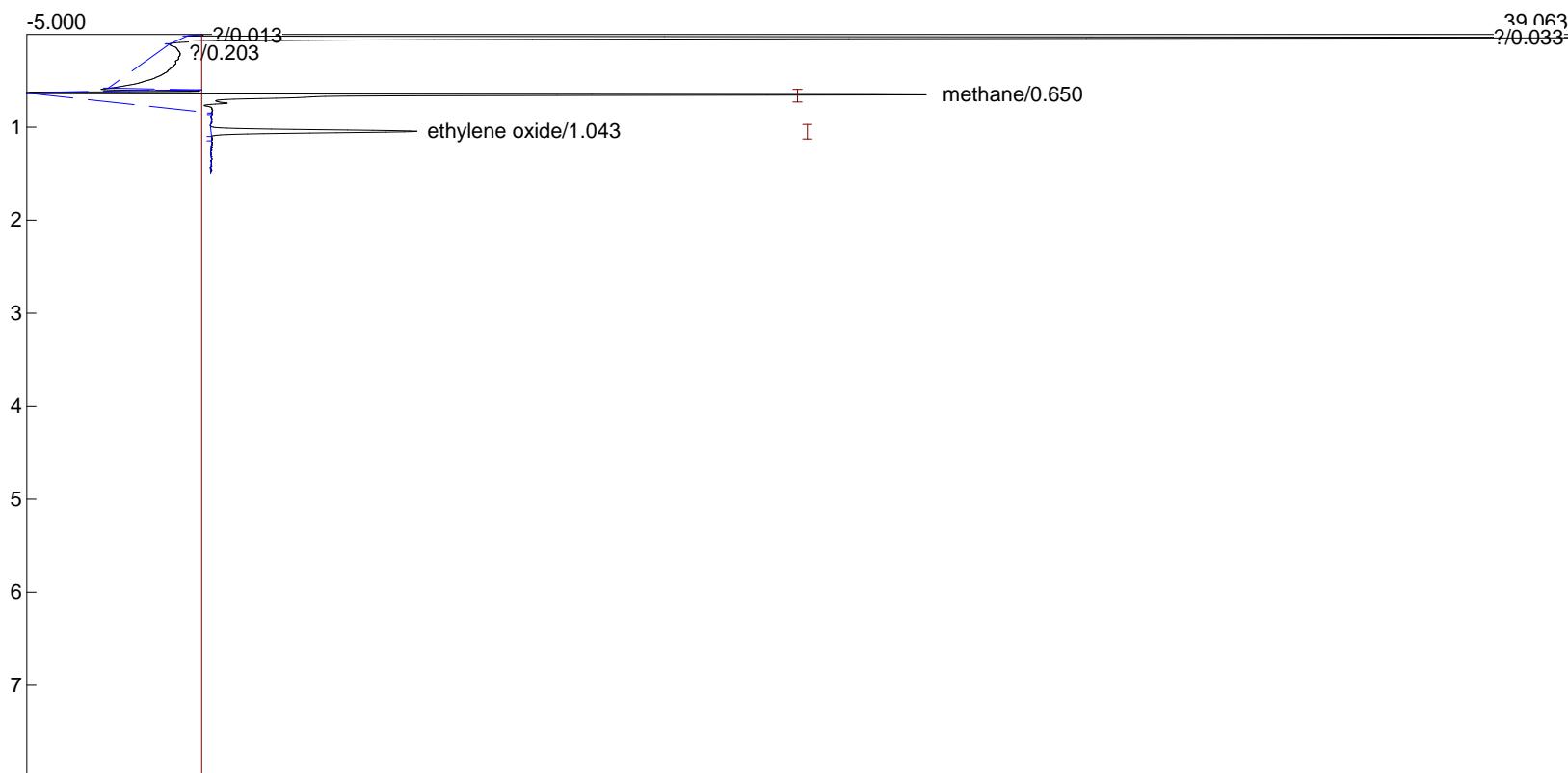
Component	Retention	Area	Height	External	Units
methane	0.643	109.9298	35.239	36.3899	
		109.9298		36.3899	



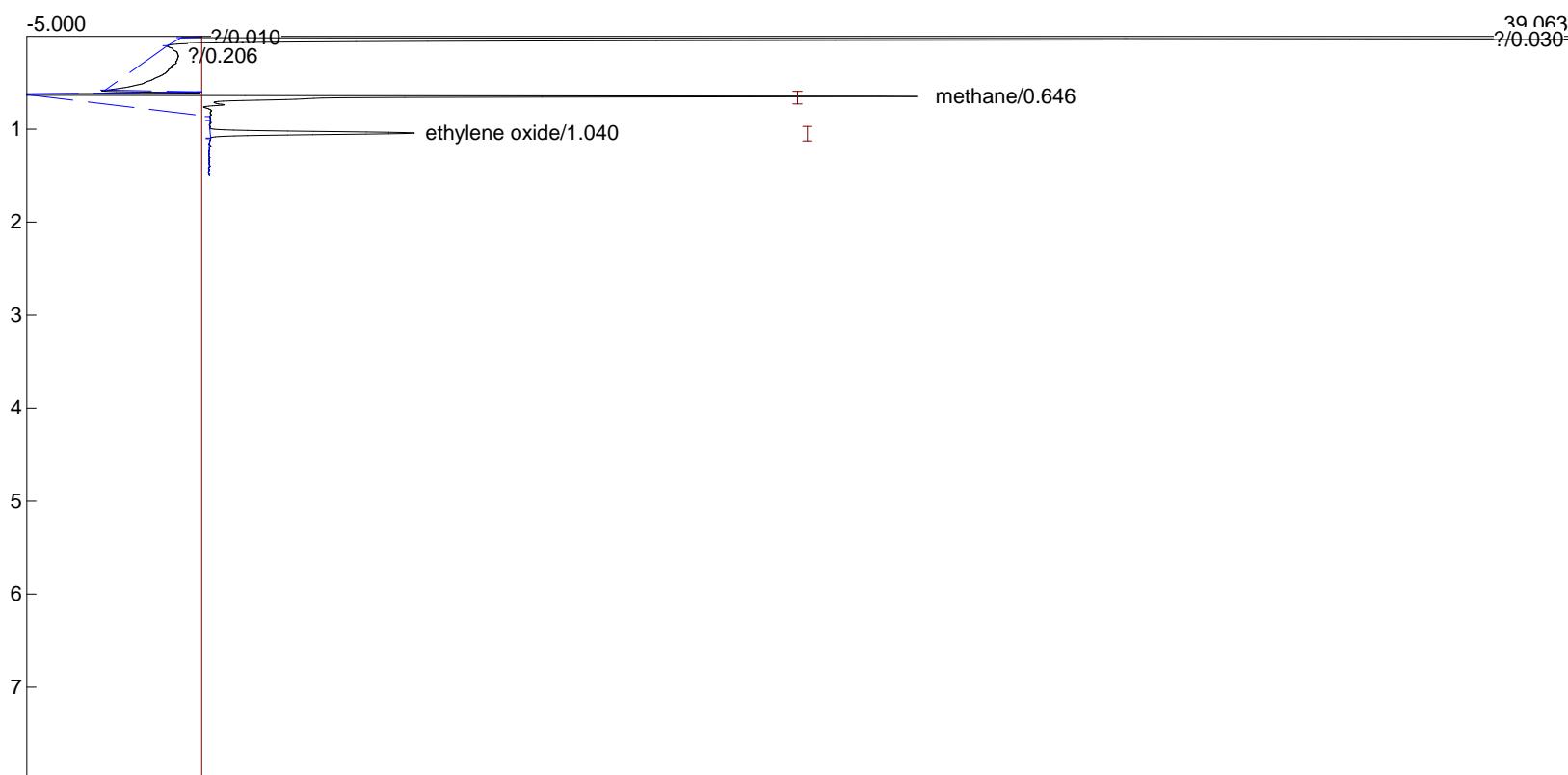
Component	Retention	Area	Height	External	Units
methane	0.646	109.4308	33.555	36.2247	
		109.4308		36.2247	



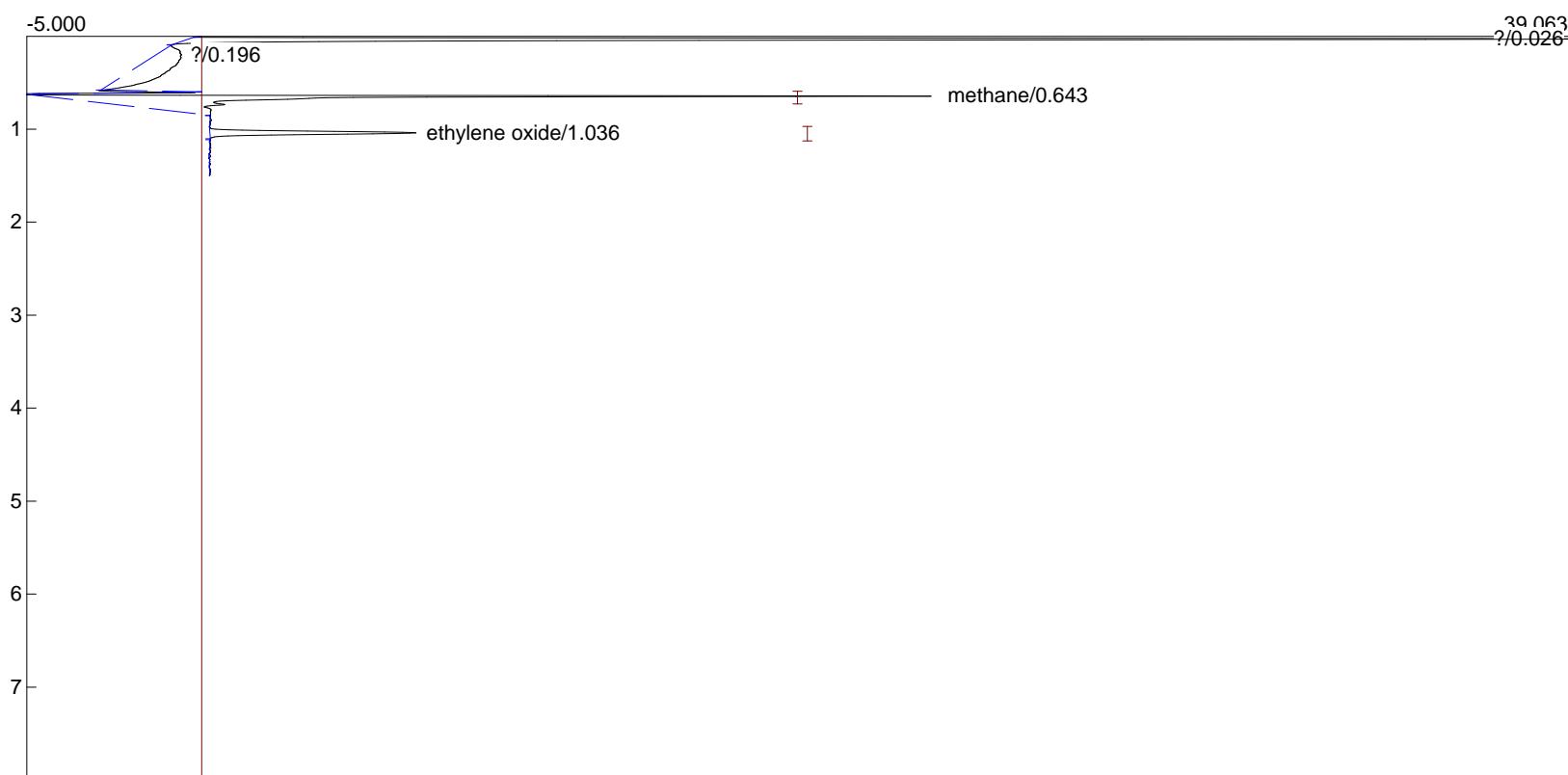
Component	Retention	Area	Height	External	Units
methane	0.646	105.8960	33.811	35.0546	
		105.8960		35.0546	



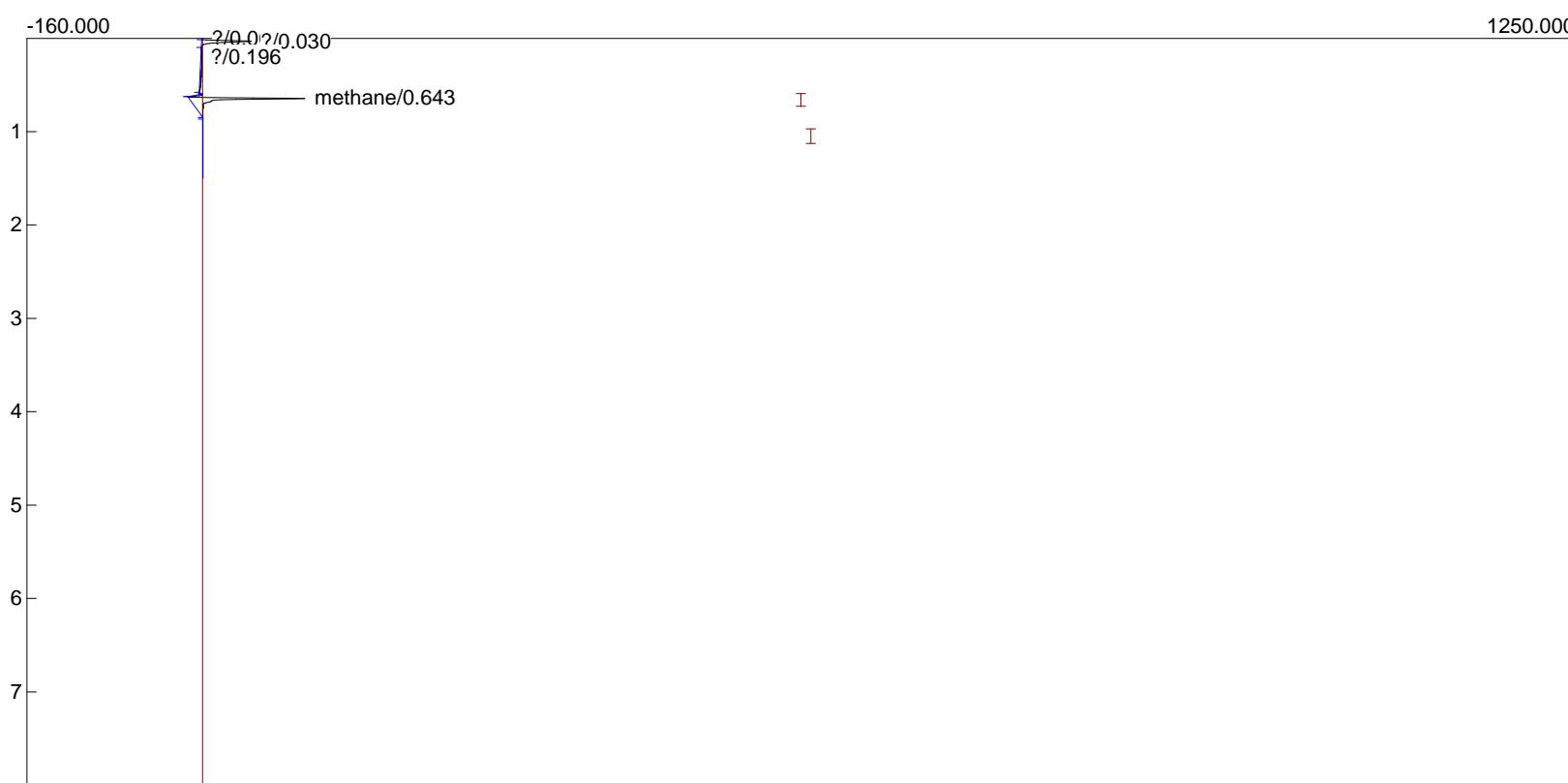
Component	Retention	Area	Height	External	Units
methane	0.650	103.8312	33.095	34.3711	
ethylene oxide	1.043	13.7180	5.922	4.7580	
		117.5492		39.1291	



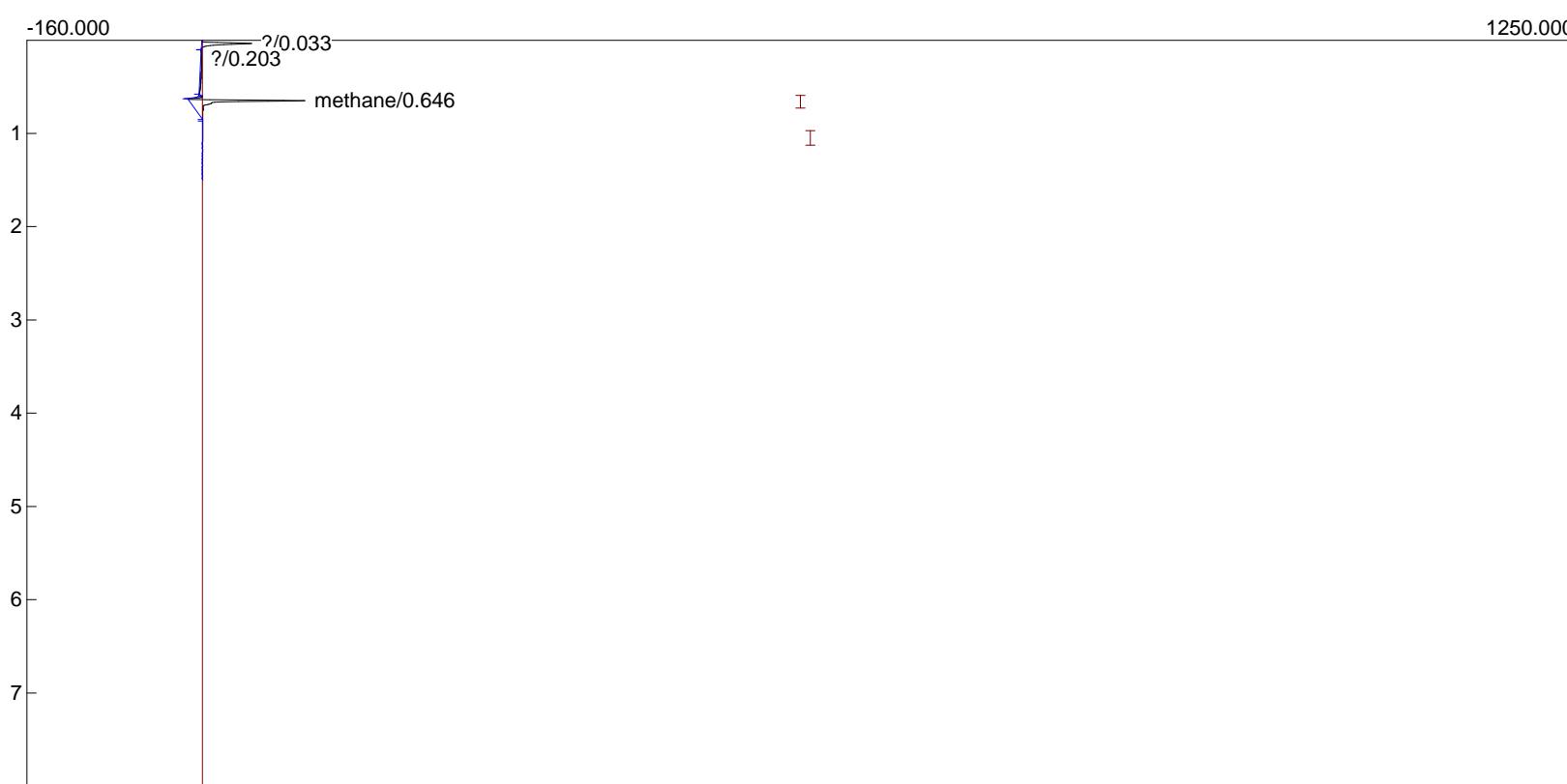
Component	Retention	Area	Height	External	Units
methane	0.646	112.8006	33.133	37.3402	
ethylene oxide	1.040	13.5644	5.898	4.7047	
		126.3650		42.0449	



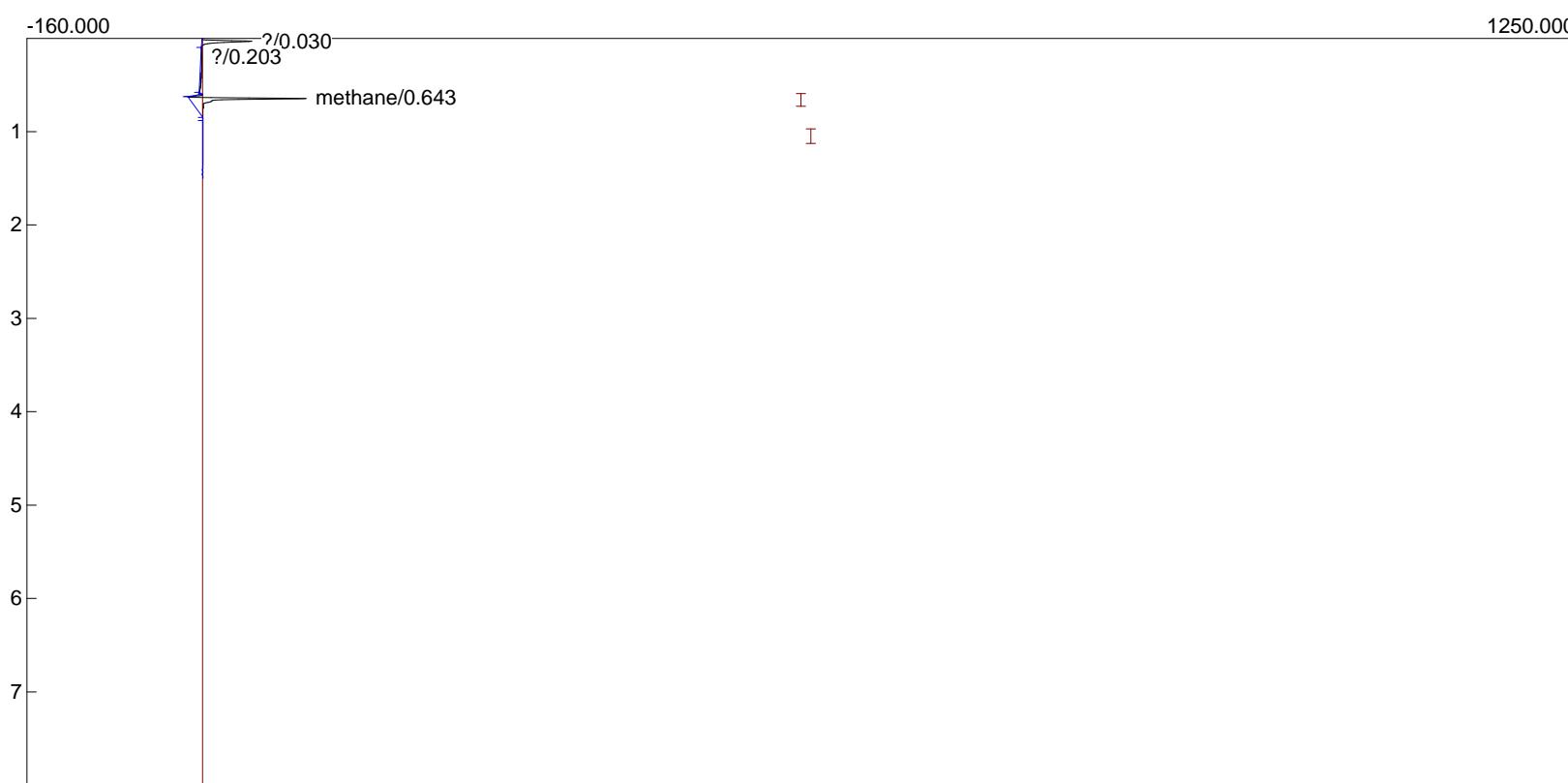
Component	Retention	Area	Height	External	Units
methane	0.643	108.8852	33.500	36.0441	
ethylene oxide	1.036	13.7087	5.929	4.7548	
		122.5939		40.7989	



Component	Retention	Area	Height	External	Units
methane	0.643	181.9426	105.962	60.2282	
		181.9426		60.2282	



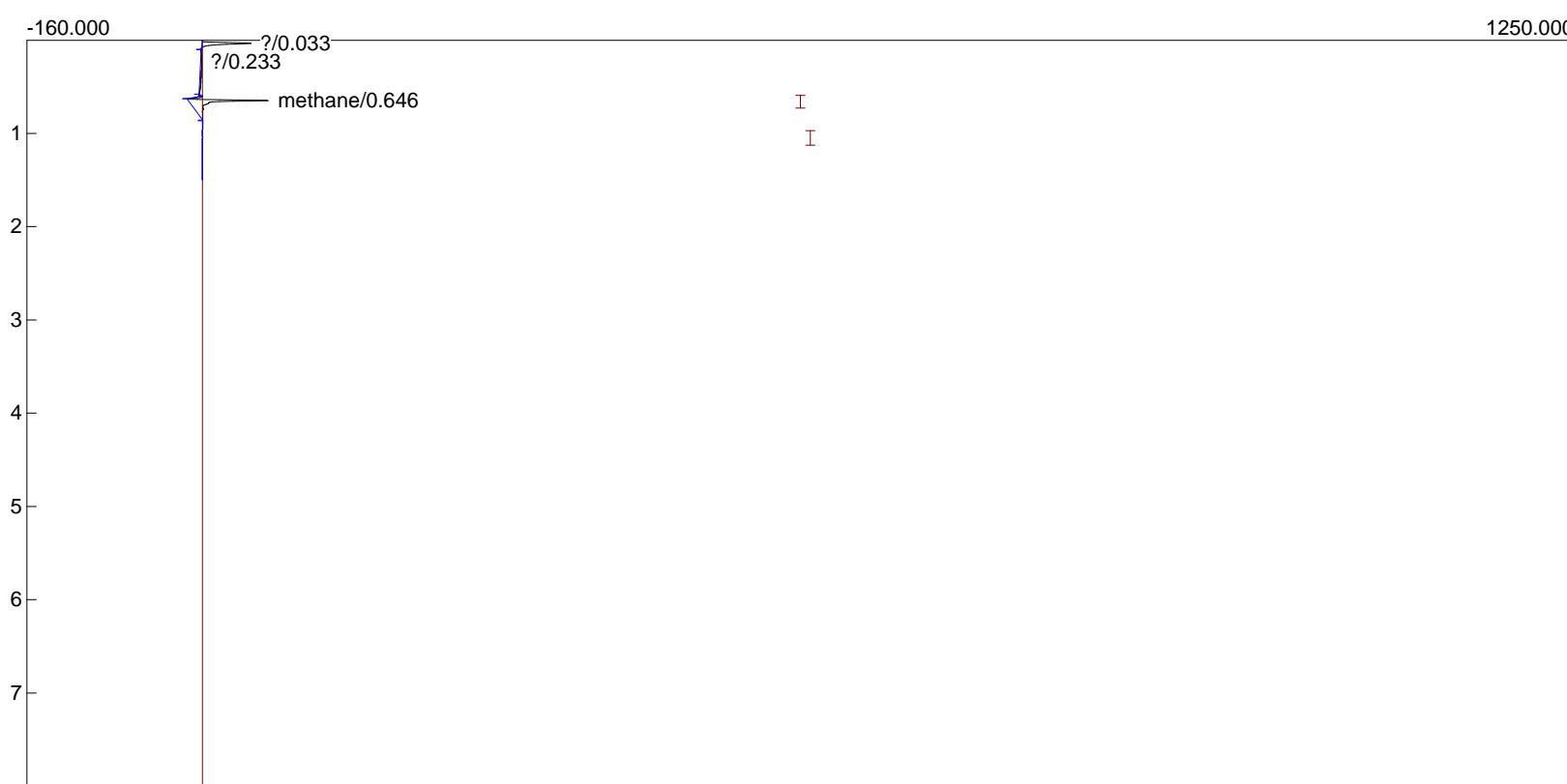
Component	Retention	Area	Height	External	Units
methane	0.646	182.8336	106.180	60.5231	
		182.8336		60.5231	



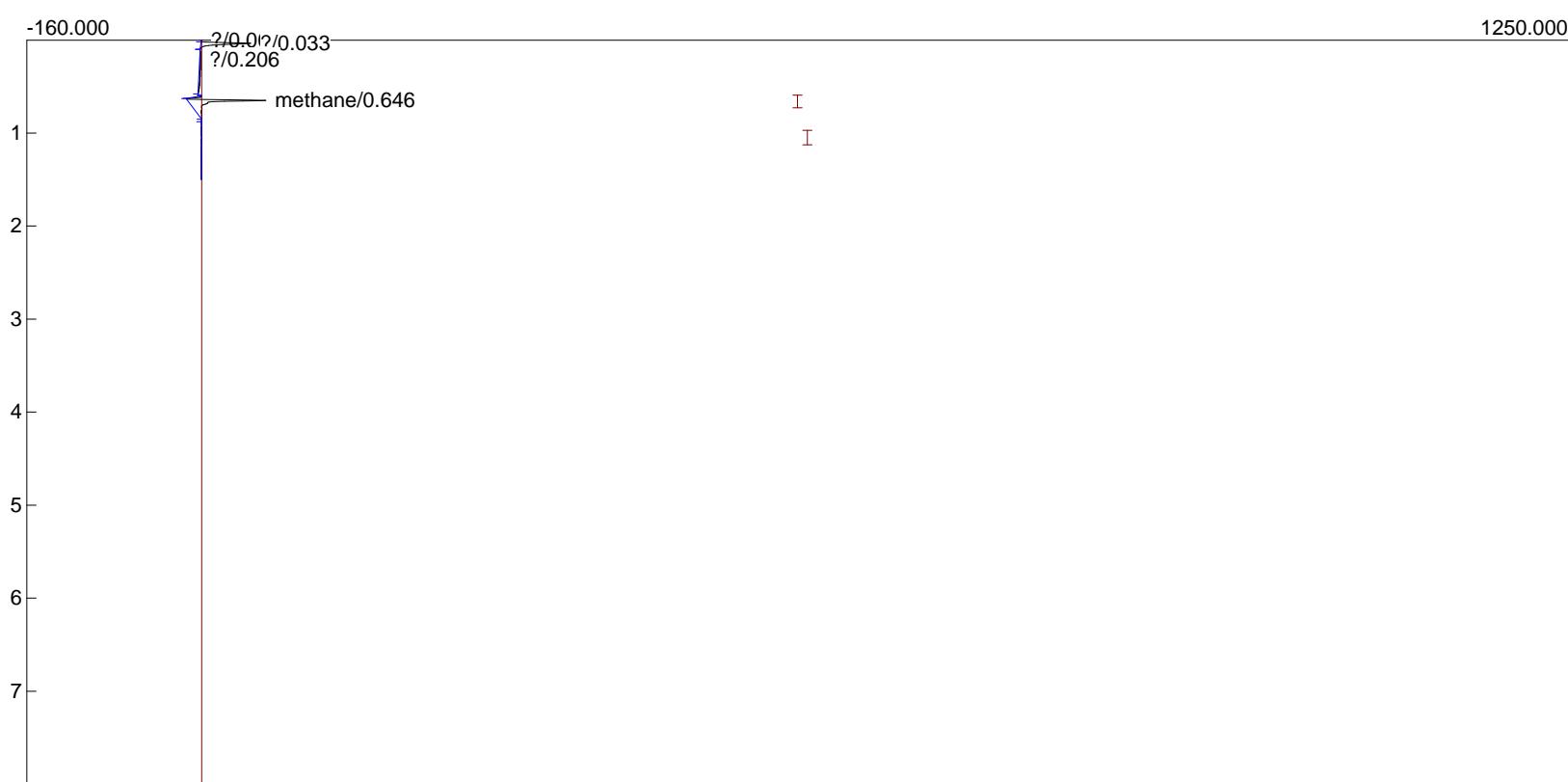
Component	Retention	Area	Height	External	Units
methane	0.643	183.0508	106.955	60.5950	
		183.0508		60.5950	



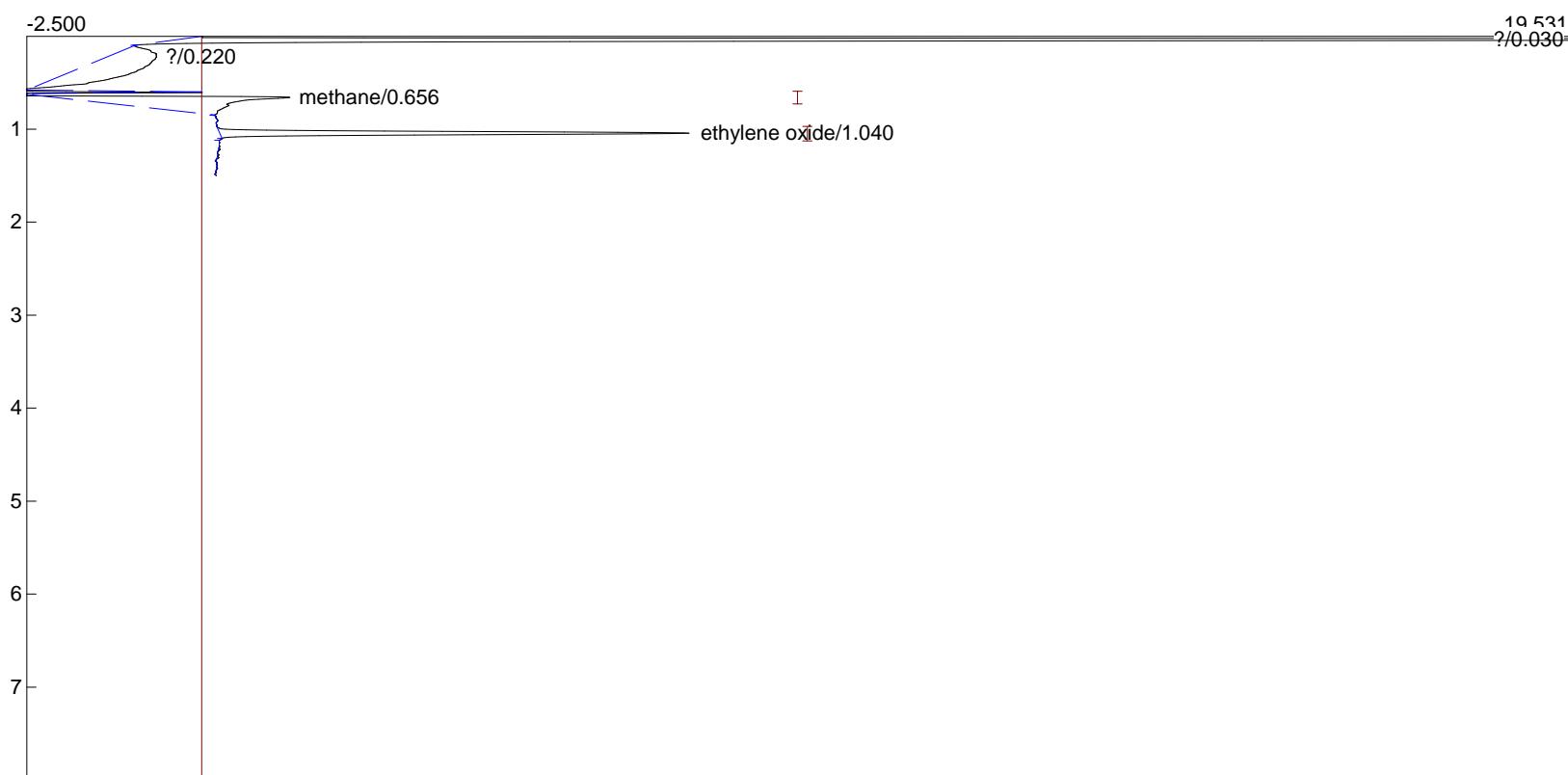
Component	Retention	Area	Height	External	Units
methane	0.646	147.9724	72.350	48.9831	
		147.9724		48.9831	



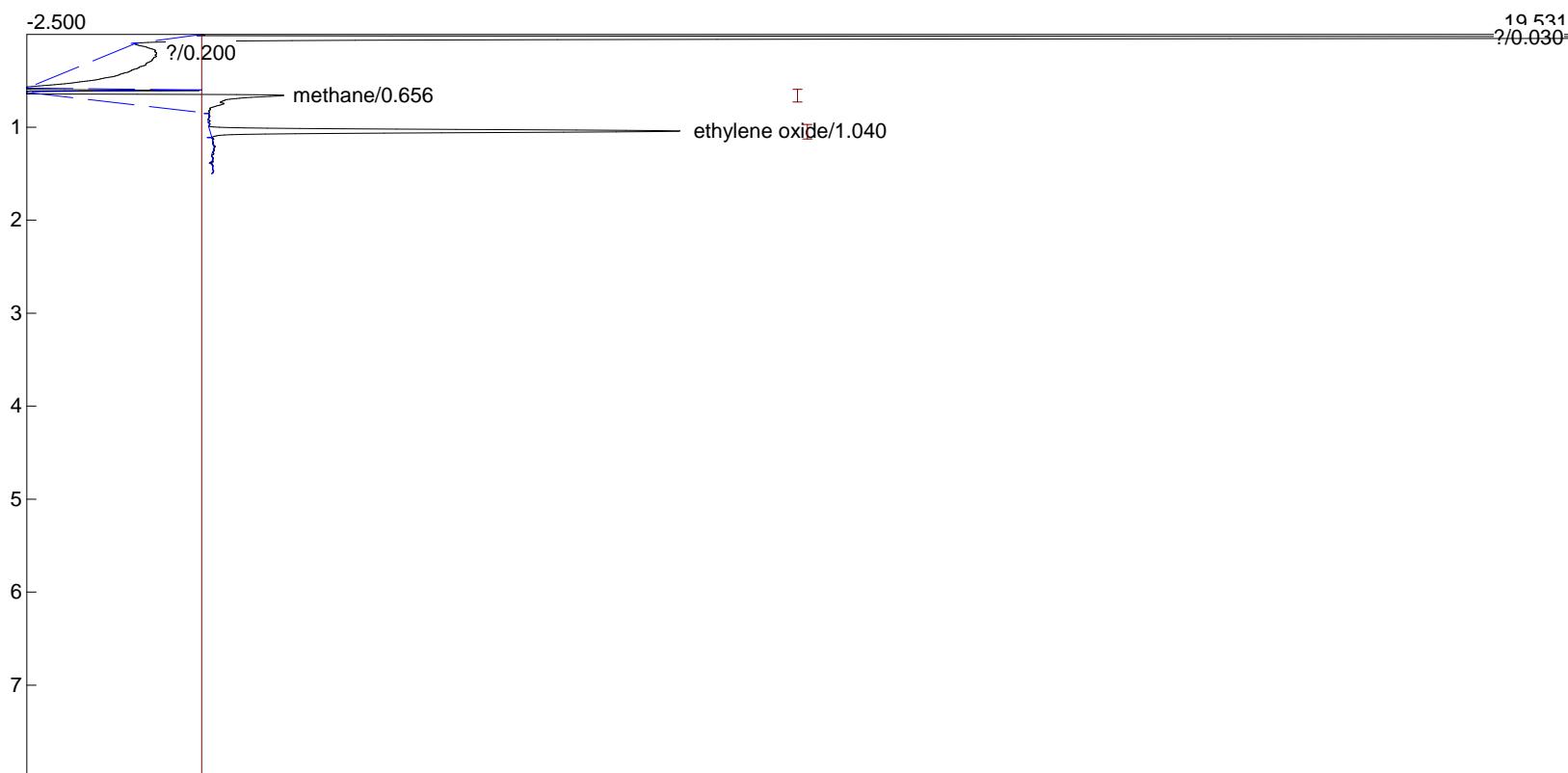
Component	Retention	Area	Height	External	Units
methane	0.646	157.0710	73.509	51.9950	
		157.0710		51.9950	



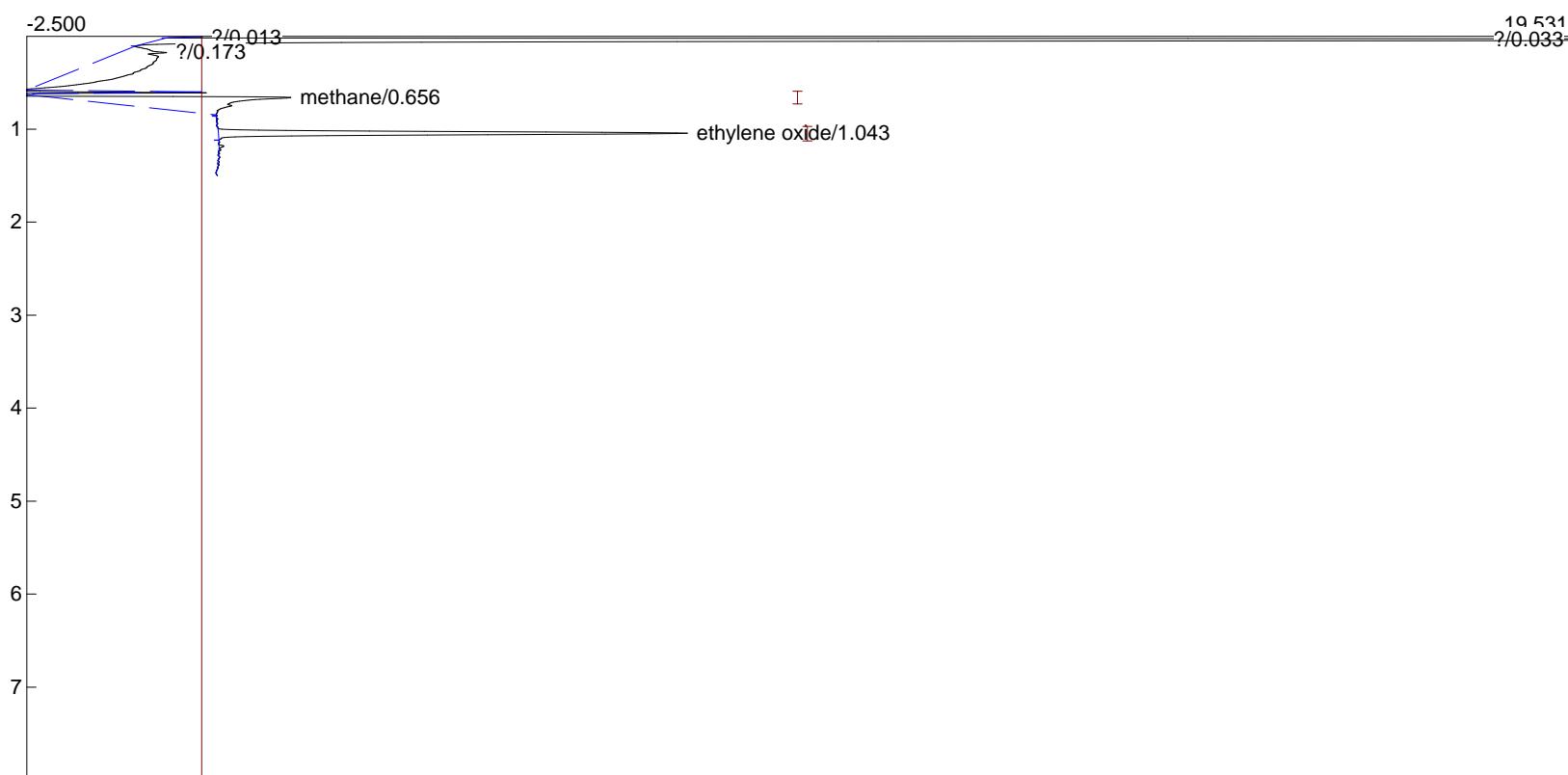
Component	Retention	Area	Height	External	Units
methane	0.646	148.2339	71.908	49.0696	
		148.2339		49.0696	



Component	Retention	Area	Height	External	Units
methane	0.656	76.0560	11.783	25.1767	
ethylene oxide	1.040	15.6555	6.744	5.4300	
		91.7115		30.6067	



Component	Retention	Area	Height	External	Units
methane	0.656	76.4326	11.718	25.3014	
ethylene oxide	1.040	15.7274	6.776	5.4549	
		92.1600		30.7563	



Component	Retention	Area	Height	External	Units
methane	0.656	73.9044	11.779	24.4645	
ethylene oxide	1.043	15.5876	6.703	5.4065	
		89.4920		29.8709	

Outlet Teflon Bag

Non-Isokinetic Source Sampling Data Sheet

Project			Source		
Id	Client	Facility	Id	Location	
Couïdien	M. Hauser	Wubbe Outlet	V2059	—	• 975 30 " 8-10-16 JC/E3/mm

Run	(Plant Time)	Initial Leak Check		Final Leak Check	
		In Hg	cfm	In Hg	cfm
1	15:22 - 16:22	5	0.000		
Elapsed Time (min)	DGM Volume (liters)	Ball Flow Meter Setting	Impinger	Temperature (°F)	Vacuum (in Hg)
0	0.000	0.15	NA	90	21
10	1.2	1	90	90	10
20	2.4	1	92	92	1.2
30	3.5	1	93	93	2.5
40	4.6	1	94	94	3.7
50	5.8	1	95	95	4.8
60	6.8	44	Initial Weight (g)	95	5.6
			Final Weight (g)	95	6.0
			Initial Weight (g)	95	7.1
			Final Weight (g)	95	7.1

Performance Test

Appendix A

Page 31 / 34

Run	Time	Initial Leak Check		Final Leak Check	
		In Hg	cfm	In Hg	cfm
2	16:54 - 17:54	3	0.000		
Elapsed Time (min)	DGM Volume (liters)	Ball Flow Meter Setting	Impinger	Temperature (°F)	Vacuum (in Hg)
0	0.000	0.000	• 15	74	94
10	1.2	1	15	95	95
20	2.5	1	15	95	95
30	3.7	1	15	95	95
40	4.8	1	15	95	95
50	5.6	1	15	95	95
60	7.1	00	Initial Weight (g)	95	95
			Final Weight (g)	95	95

Run	Time	Initial Leak Check		Final Leak Check	
		In Hg	cfm	In Hg	cfm
3	18:50 - 19:50	3	0.000		
Elapsed Time (min)	DGM Volume (liters)	Ball Flow Meter Setting	Impinger	Temperature (°F)	Vacuum (in Hg)
0	0.000	15	15	88	21
10	1.1	1	88	88	10
20	2.2	1	87	87	20
30	3.2	1	88	88	30
40	4.2	1	88	88	40
50	5.3	1	88	88	50
60	6.3	88	Initial Weight (g)	88	88
			Final Weight (g)	88	88

Flow Data

Notes:

Flow Data

Notes:

Non-Isokinetic Source Sampling Data Sheet - Method 4

Project			Source			Dry Gas Meter			Date			Operators	
Id	Client	Facility	Id	Location		Id		ΔH @ Y		Barometric Pressure (in Hg)		Initial	Final
(00001-2) Covdien		With Then Oxidizer		Stick		2176	1.779	0.999	30.11	8-10-16	E.B		

Run	Time	DGM Volume (liters) Cubic feet	Initial Leak Check			Final Leak Check			Run			Initial Leak Check			Final Leak Check			
			in Hg		cfm	in Hg		cfm	in Hg		cfm	in Hg		cfm	in Hg		cfm	
			Impinger	DGM In	DGM Out	Temperature (°F)	Vacuum (in Hg)	Cubic feet	Elapsed Time (min)	DGM Volume (liters) Cubic feet	Bath Flow Meter Setting ΔH	Temperature (°F)	Vacuum (in Hg)	DGM In	DGM Out	Impinger	DGM In	DGM Out
1	15:22 - 16:22	68.028	1.8	68	81	80	2	0	111.548	1.8	68	86	86	2				
		75.5	1.8	68	82	80	2	10	118.8	1.8	63	88	86	2				
		82.8	1.8	67	85	81	2	20	126.2	1.8	63	91	86	2				
		90.3	1.8	67	88	84	2	30	133.5	1.8	64	94	87	2				
		97.6	1.8	65	91	85	2	40	140.8	1.8	64	94	88	2				
		104.9	1.8	64	92	86	2	50	148.4	1.8	64	95	88	2				
		111.419		Initial Weight (g)	3918	Final Weight (g)	3642	60	155.894	Initial Weight (g)	3642	Final Weight (g)	3624					

Run	Time	DGM Volume (liters) Cubic feet	Initial Leak Check			Final Leak Check			Run			Initial Leak Check			Final Leak Check			
			in Hg		cfm	in Hg		cfm	in Hg		cfm	in Hg		cfm	in Hg		cfm	
			Impinger	DGM In	DGM Out	Temperature (°F)	Vacuum (in Hg)	Cubic feet	Elapsed Time (min)	DGM Volume (liters) Cubic feet	Bath Flow Meter Setting ΔH	Temperature (°F)	Vacuum (in Hg)	DGM In	DGM Out	Impinger	DGM In	DGM Out
2	18:50 - 19:50	163.3	1.8	68	87	86	2	0	163.3	1.8	61	88	86	2				
		171.7	1.8	63	91	87	2	10	171.7	1.8	63	91	87	2				
		179.2	1.8	65	93	88	2	20	179.2	1.8	65	93	88	2				
		186.6	1.8	65	94	89	2	30	186.6	1.8	65	94	89	2				
		194.0	1.8	66	95	90	2	40	194.0	1.8	66	95	90	2				
		201.421		Initial Weight (g)	3674	Final Weight (g)	3699	60	201.421									

Run	Time	DGM Volume (liters) Cubic feet	Initial Leak Check			Final Leak Check			Run			Initial Leak Check			Final Leak Check			
			in Hg		cfm	in Hg		cfm	in Hg		cfm	in Hg		cfm	in Hg		cfm	
			Impinger	DGM In	DGM Out	Temperature (°F)	Vacuum (in Hg)	Cubic feet	Elapsed Time (min)	DGM Volume (liters) Cubic feet	Bath Flow Meter Setting ΔH	Temperature (°F)	Vacuum (in Hg)	DGM In	DGM Out	Impinger	DGM In	DGM Out
3	18:50 - 19:50	163.3	1.8	68	87	86	2	0	163.3	1.8	61	88	86	2				
		171.7	1.8	63	91	87	2	10	171.7	1.8	63	91	87	2				
		179.2	1.8	65	93	88	2	20	179.2	1.8	65	93	88	2				
		186.6	1.8	65	94	89	2	30	186.6	1.8	65	94	89	2				
		194.0	1.8	66	95	90	2	40	194.0	1.8	66	95	90	2				
		201.421		Initial Weight (g)	3674	Final Weight (g)	3699	60	201.421									

APPENDIX B

OXIDIZER INLET EMISSIONS TEST DATA

Covidien - North Haven, CT
Oxidizer Inlet (24-inch horizontal pipe)

EPA 1, 2, 18
Summary Table

Canomara LLC
Source Testing Services

Item	Description	Run 1	Run 2	Run 3	Average	Compliance
Date	Test Date	Run 1! 8/10/2016	Run 2! 8/10/2016	Run 3! 8/10/2016		
Start	Run Start Time	15:22	16:54	18:50		
Finish	Run Finish Time	16:22	17:54	19:50		
θ	Net Run Time, minutes	60.0	60.0	60.0	60.0	
N_{tp}	Net Traversing Points	12	12	12	12	
C_p	Pitot Tube Coeficient	0.840	0.840	0.840	0.840	
P_{Br}	Barometric Pressure, inches of Mercury	30.11	30.11	30.11	30.11	
% H ₂ O	Moisture Content of Stack Gas, %	2.1	2.1	2.1	2.1	
M _{fd}	Dry Mole Fraction	0.979	0.979	0.979	0.979	
%CO ₂	Carbon Dioxide, %	0.00	0.00	0.00		
%O ₂	Oxygen, %	20.74	20.82	20.77	20.78	
% CO + N ₂	Carbon Monoxide & Nitrogen, %	79.3	79.2	79.2	79.2	
% EA	Percent Excess Air, %	10263.4	20626.2	12653.0	14514.2	
M _d	Dry Molecular Weight, lb/lb-Mole	28.83	28.83	28.83	28.83	
M _s	Wet Molecular Weight, lb/lb-Mole	28.61	28.61	28.61	28.61	
P _g	Flue Gas Static Pressure, inches of H ₂ O	-3.00	-2.40	-3.00	-2.80	
P _s	Absolute Flue Gas Pressure, inches of Mercury	29.89	29.93	29.89	29.90	
T _s	Average Stack Gas Temperature, °F	90.4	92.9	90.0	91.1	
ΔP _{avg}	Average Velocity Head, inches of H ₂ O	0.376	0.399	0.374	0.383	
A _s	Stack Crossectional Area, square feet	3.1	3.1	3.1	3.1	
FLOW						
V _s	Average Stack Gas Velocity, fps	35.3	36.3	35.1	35.5	
V _s (fpm)	Average Stack Gas Velocity, fpm	2,116	2,177	2,104	2,132	
Q _{aw}	Actual Wet Volumetric Flue Gas Flow Rate, acfm	6,647	6,839	6,611	6,699	
Q _{sw}	Standard Wet Volumetric Flue Gas Flow Rate, scfm	6,370	6,534	6,340	6,415	
Q _{sw} (scfh)	Standard Wet Volumetric Flue Gas Flow Rate, scfh	382,186	392,049	380,384	384,873	
Q _{sd}	Standard Dry Volumetric Flow Rate, dscfm	6,238	6,399	6,208	6,282	
Q _{sd} (dscfh)	Standard Dry Volumetric Flow Rate, dscfh	374,260	383,935	372,495	376,897	
ETHYLENE OXIDE						
EO _{ppm-inlet}	Ethylene Oxide Concentration, ppm-wet	522.99	738.95	649.60	637.18	
EO _{lb/hour-inlet}	Ethylene Oxide Emission Rate, lb/hour	22.86	33.14	28.26	28.09	

Oxidizer Inlet Method 18 Summary**10-Aug-16****Covidien****Run 1**

Compound	Concentration (ppm)				Deviation			Recovery	Corrected (ppm)
	1	2	3	Average					
EO	446.7949	449.7038	449.3921	448.6303	0.4%	-0.2%	-0.2%	0.86	522.99

Run 2

Compound	Concentration (ppm)				Deviation			Recovery	Corrected (ppm)
	1	2	3	Average					
EO	633.1492	633.1438	635.3389	633.8773	0.1%	0.1%	-0.2%	0.86	738.95

Run 3

Compound	Concentration (ppm)				Deviation			Recovery	Corrected (ppm)
	1	2	3	Average					
EO	555.7	556.0	560.0	557.2	0.3%	0.2%	-0.5%	0.86	649.60

Oxidizer Inlet Method 18 Initial Calibration**10-Aug-16****Covidien****Standards**

	Low	Mid	High
Cylinder ID	EA0011746	FF56997	EA0011722
Expiration Date	5/21/2017	5/21/2017	5/21/2017
EO (ppm)	98.9	1000	2000

High

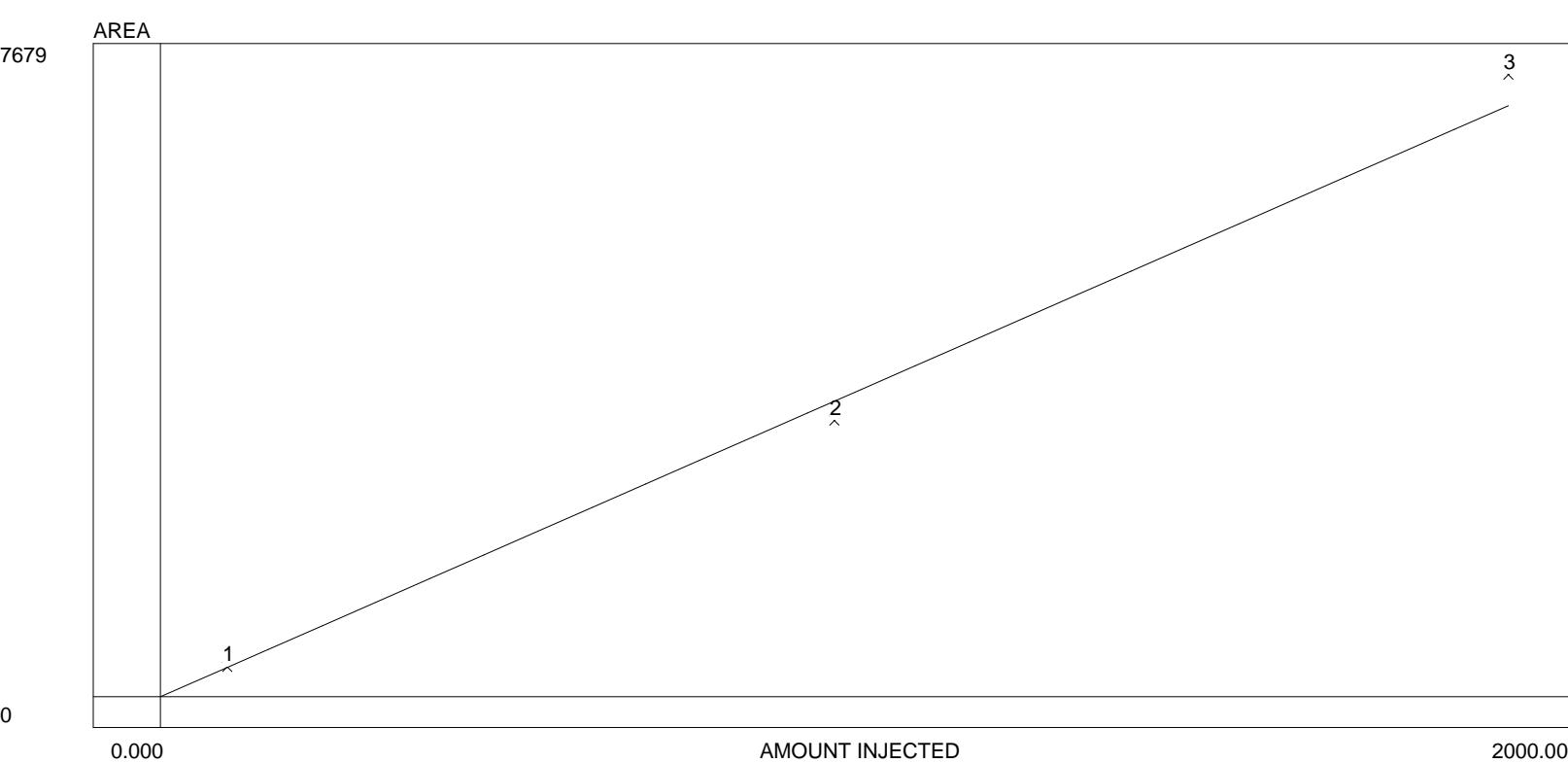
Compound	Conc	Injection									Average	Accuracy	
		29			30			31					
		Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	
EO	2000.00	7675.52	2103.99	0.04%	7676.56	2104.27	0.03%	7683.74	2106.24	-0.07%	7678.61	2104.83	5.24

Mid

Compound	Conc	Injection									Average	Accuracy	
		26			27			28					
		Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	
EO	1000.00	3436.30	941.95	-0.84%	3392.34	929.90	0.45%	3394.18	930.40	0.39%	3407.61	934.08	6.59

Low

Compound	Conc	Injection									Average	Accuracy	
		23			24			25					
		Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	
EO	98.90	365.61	100.22	0.02%	363.96	99.77	0.47%	367.43	100.72	-0.48%	365.67	100.24	1.35



Avg slope of curve: 3.65

Y-axis intercept: 0.00

Linearity: 1.00

Number of levels: 3

SD/rel SD of CF's: 0.2/6.0
Y-3 6481 Y

$r^2: 0.9956$

r²: 0.9956
Least squares

Last calibrated: Wed Aug 10 12:07:52 2016

Lvl.	Area/ht.	Amount	CF
1	365.666	98.900	3.697
2	3407.609	1000.000	3.408
3	7678.611	2000.000	3.839

Oxidizer Inlet Method 18 Recovery Study Summary**10-Aug-16****Covidien****Recovery Summary**

Compound	Sample ID	Sample Volume	(u) Un-Spiked Sample Response (ppm)	Sample Mass	Standard Volume (ml)	Standard Conc (ppm)	Standard Mass	Spiked Bag Total Conc (ppm)	(s) Theoretical Spike Conc (ppm)	(t) Spiked Sample Response (ppm)	(t-u)/s Recovery (%)
EO	1	6748	448.6	3027357	1000	2000.0	2000000	648.86	200.23	620.39	86%

Spiked Sample Analysis

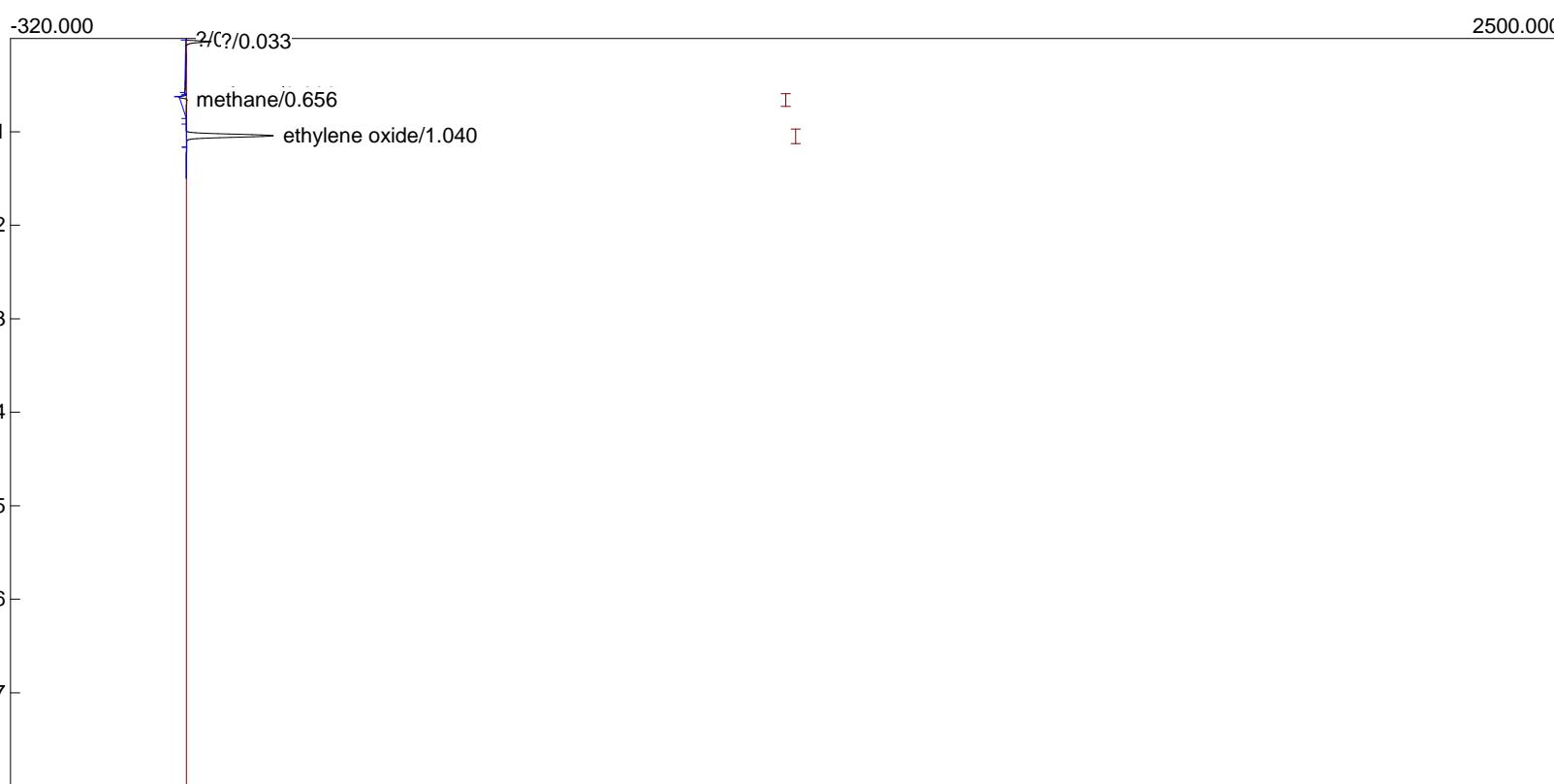
Compound	Concentration (ppm)				Deviation		
	1	2	3	average (t)			
EO	622.9	618.3	620.0	620.39	-0.4%	0.3%	0.1%

Oxidizer Outlet Method 18 Post Test Calibration**10-Aug-16****Covidien****Mid Post Cal**

Compound	Conc	Injection										Average		Accuracy	Drift		
		1			2			3									
		Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc					
EO	1000.00	3309.61	907.2195	-0.3%	3297.525	903.9064	0.1%	3294.938	903.1972	0.2%	3300.69	904.77	9.52	-3.24%			



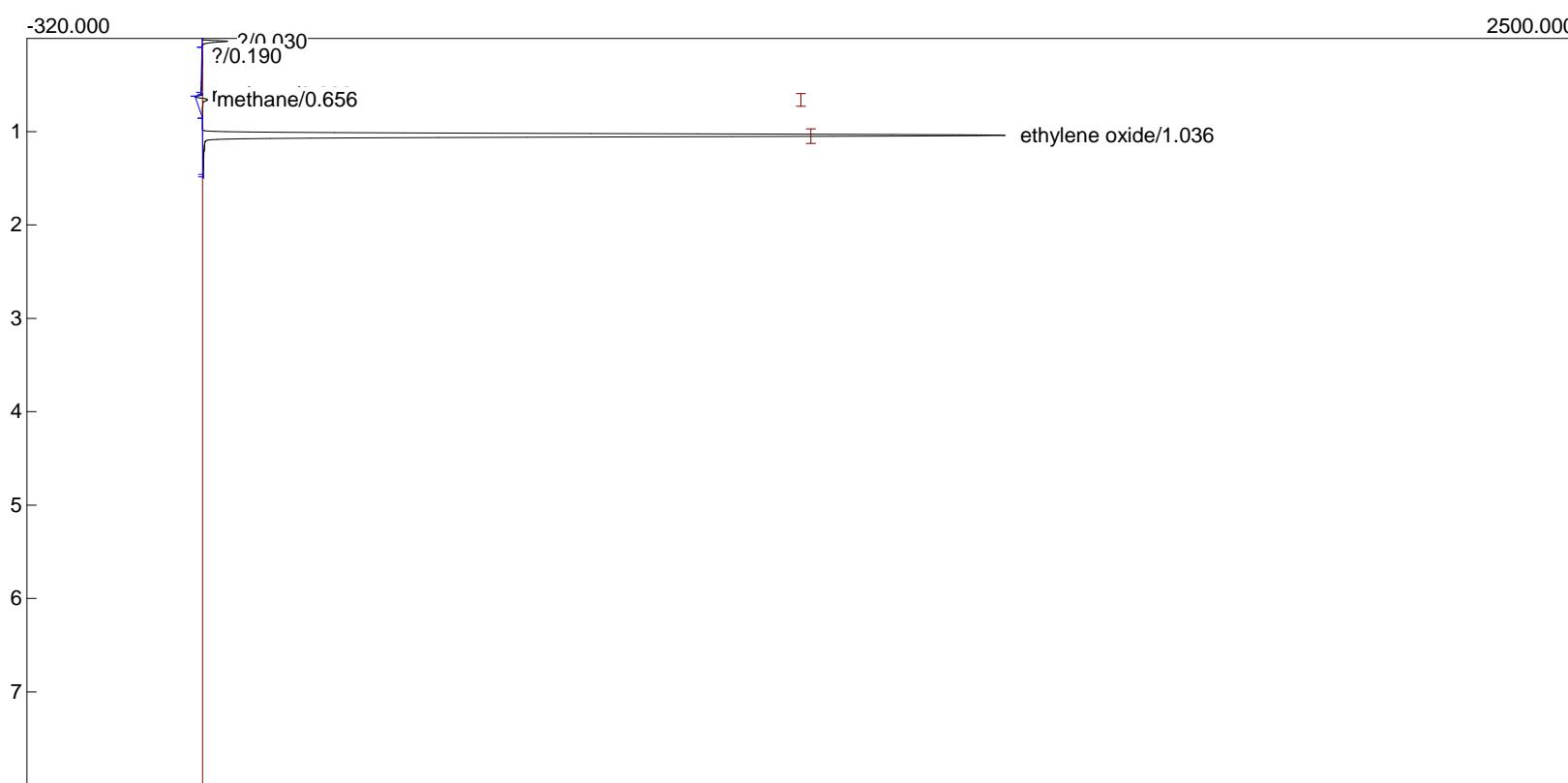
Component	Retention	Area	Height	External	Units
methane	0.600	2.2828	0.271	0.7557	
methane	0.653	83.5327	12.590	27.6517	
ethylene oxide	1.033	365.6060	159.133	100.2187	
		451.4215		128.6261	



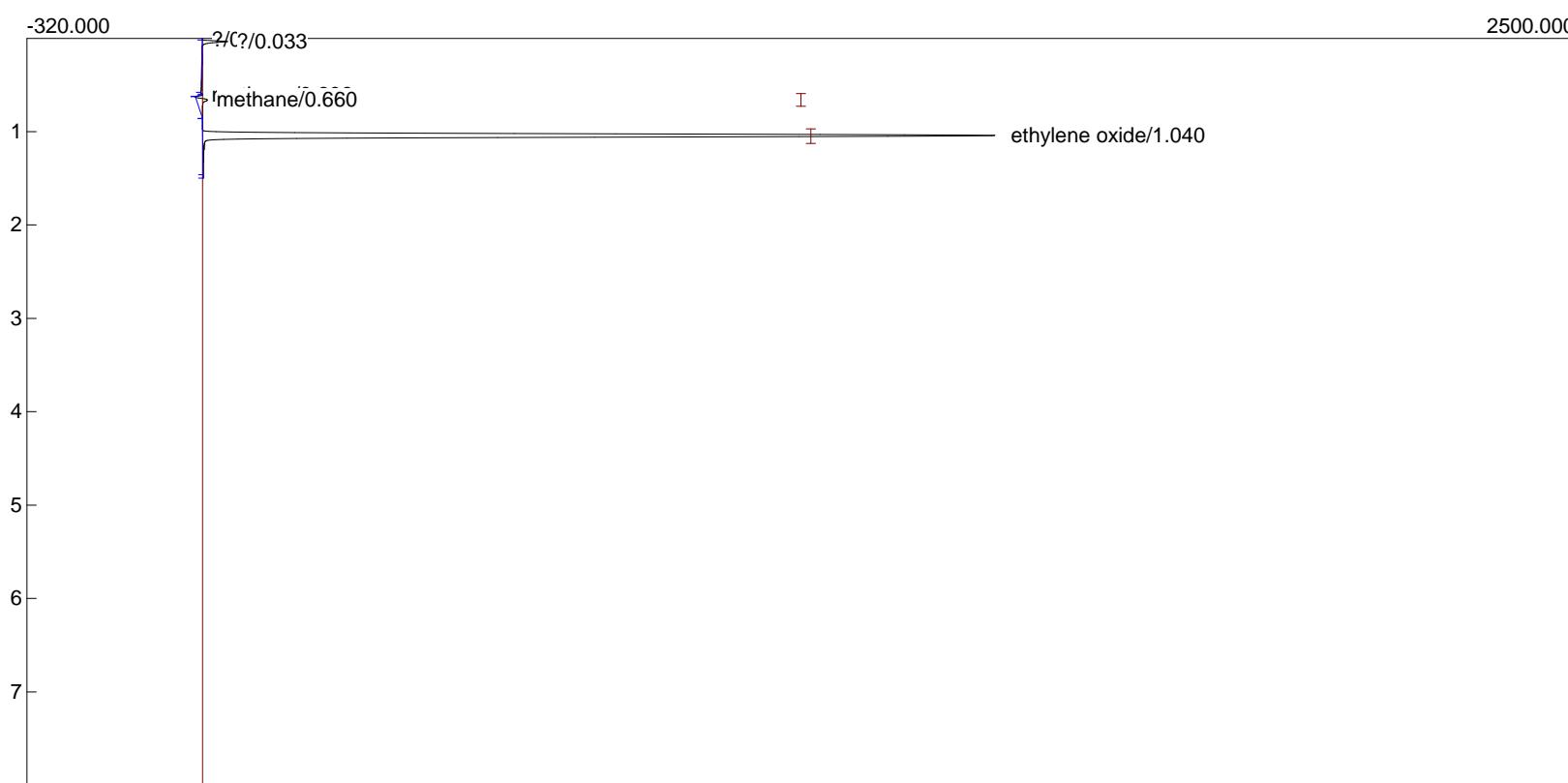
Component	Retention	Area	Height	External	Units
methane	0.606	3.7341	3.506	1.2361	
methane	0.656	83.6504	12.468	27.6907	
ethylene oxide	1.040	363.9620	159.027	99.7680	
		451.3465			128.6948



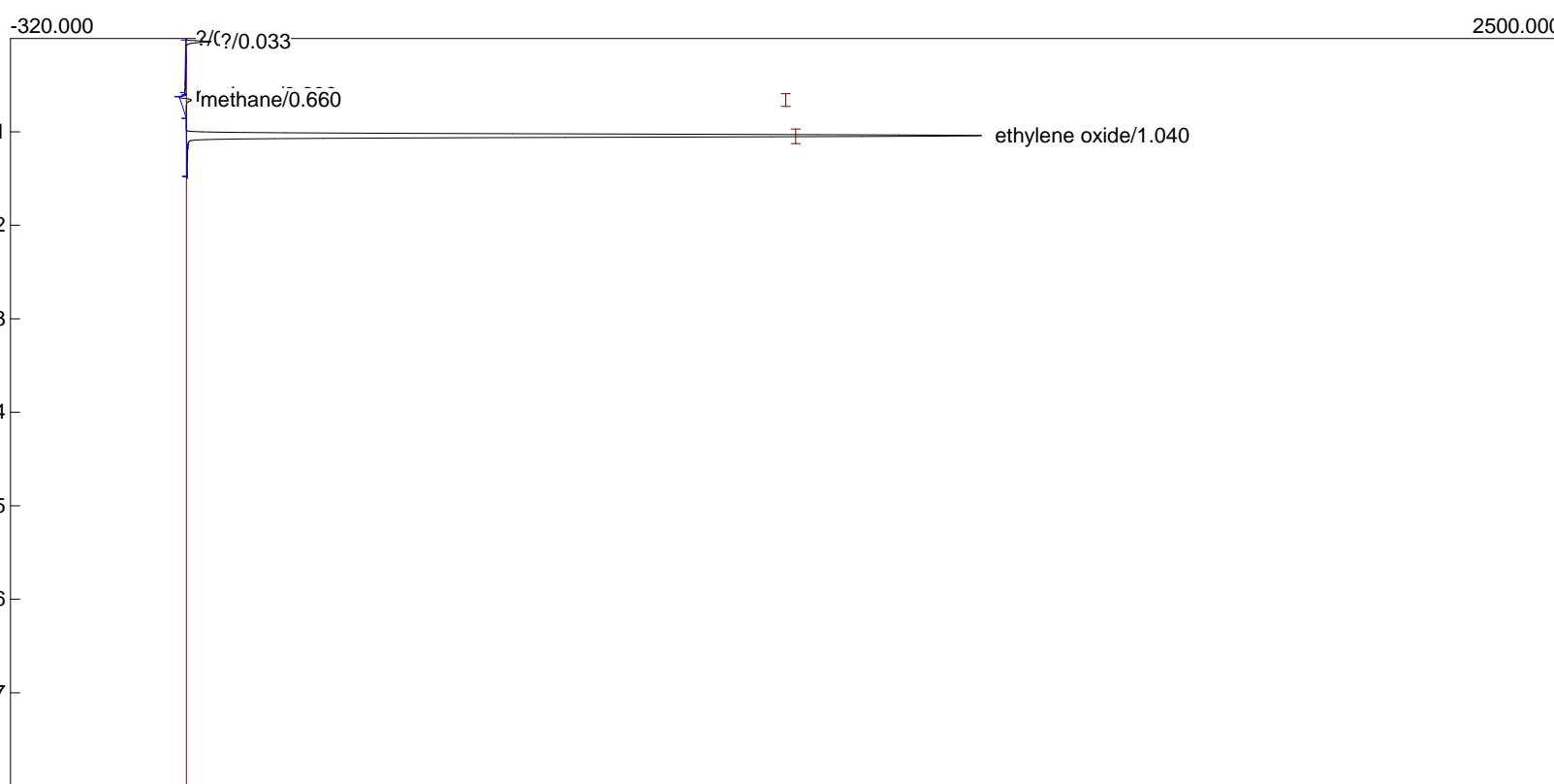
Component	Retention	Area	Height	External	Units
methane	0.606	3.8918	3.560	1.2883	
methane	0.656	80.4687	12.585	26.6374	
ethylene oxide	1.040	367.4310	160.410	100.7189	
		451.7915			128.6447



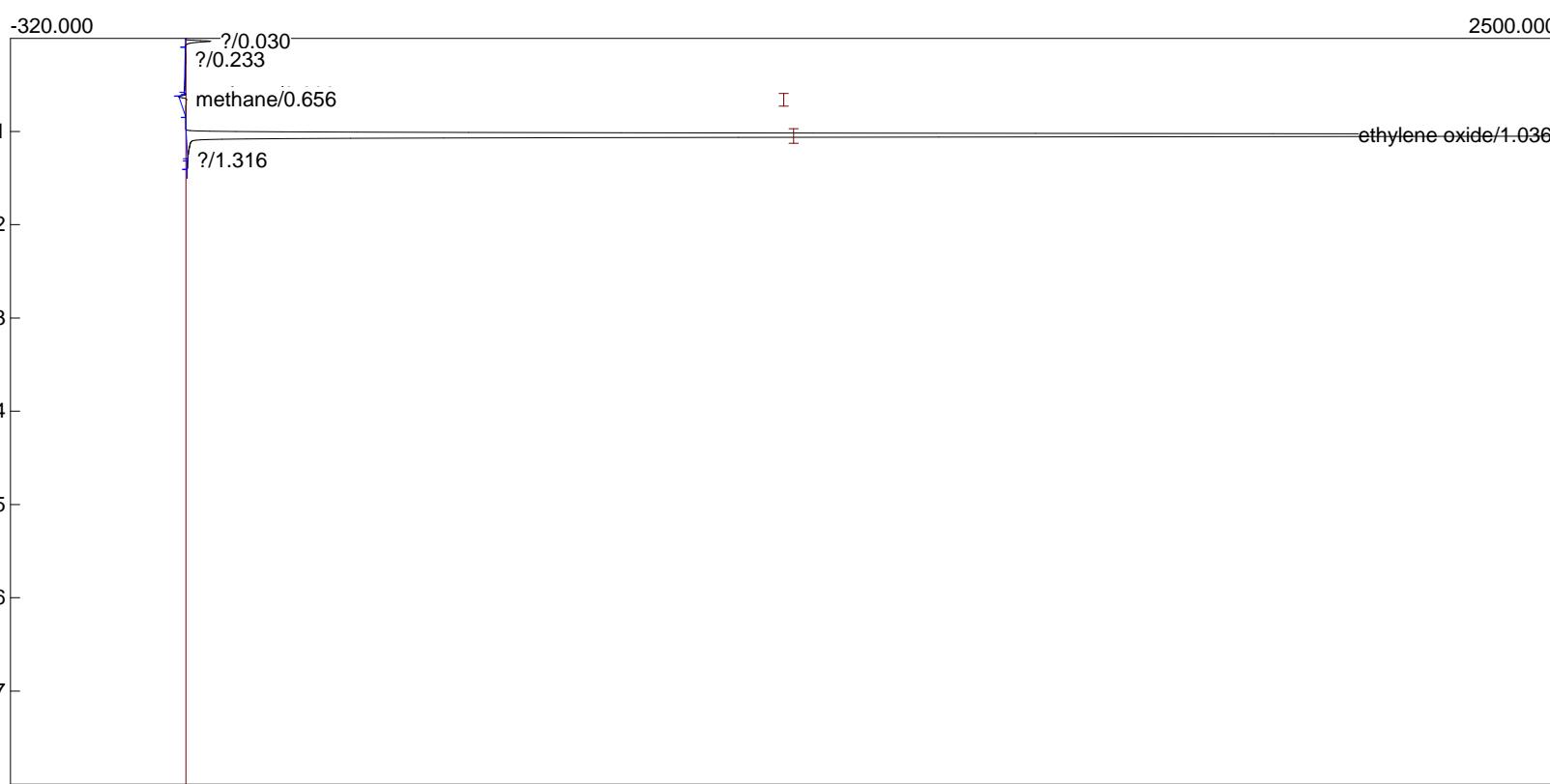
Component	Retention	Area	Height	External	Units
methane	0.603	3.2680	2.210	1.0818	
methane	0.656	98.5136	20.340	32.6108	
ethylene oxide	1.036	3436.3042	1472.291	941.9480	
			3538.0858	975.6406	



Component	Retention	Area	Height	External	Units
methane	0.606	3.9094	3.541	1.2941	
methane	0.660	97.3186	20.085	32.2152	
ethylene oxide	1.040	3392.3424	1455.206	929.8973	
		3493.5704		963.4067	



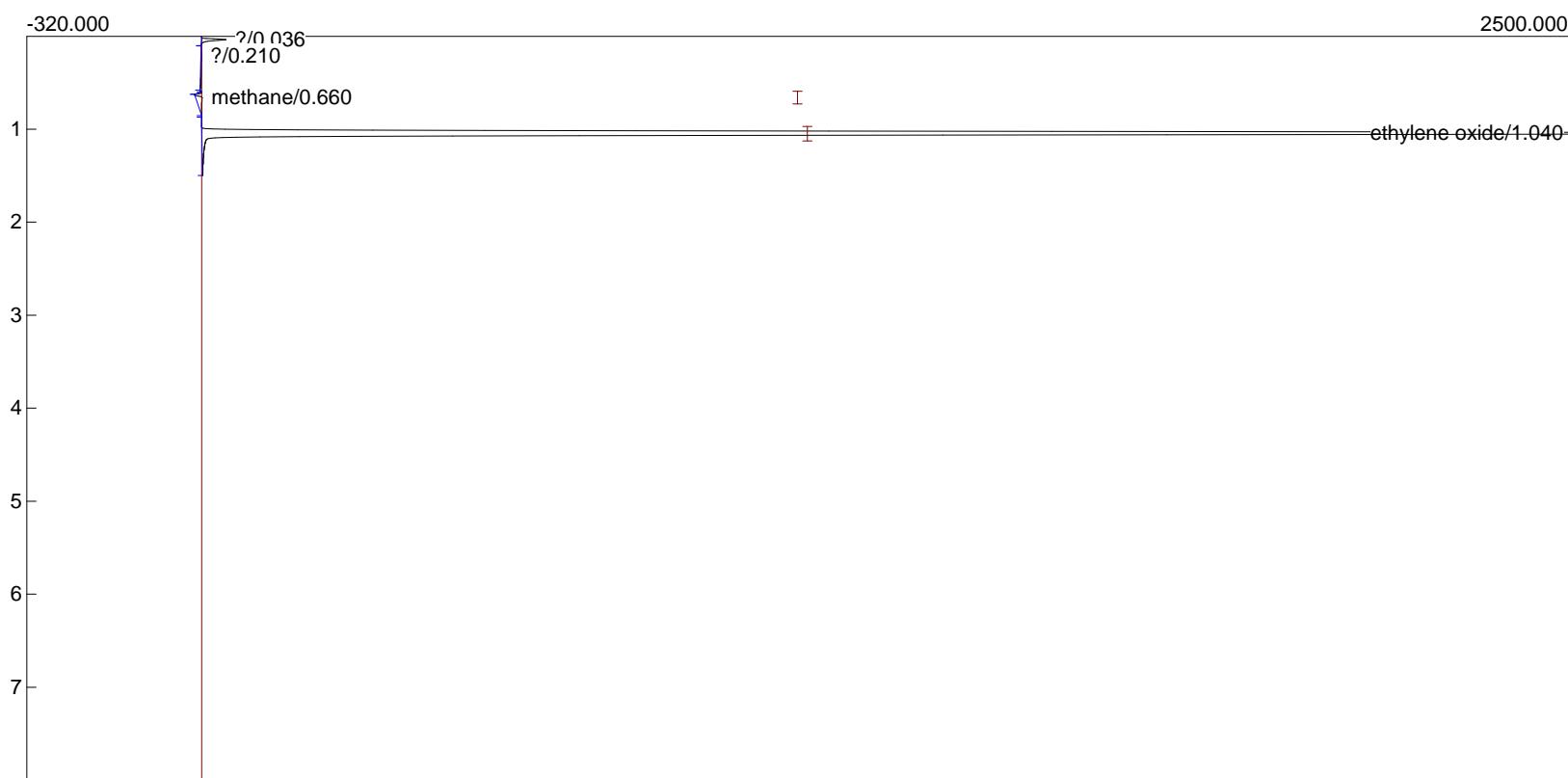
Component	Retention	Area	Height	External	Units
methane	0.606	3.7879	3.614	1.2539	
methane	0.660	95.6898	19.981	31.6761	
ethylene oxide	1.040	3394.1794	1453.420	930.4009	
		3493.6571		963.3309	



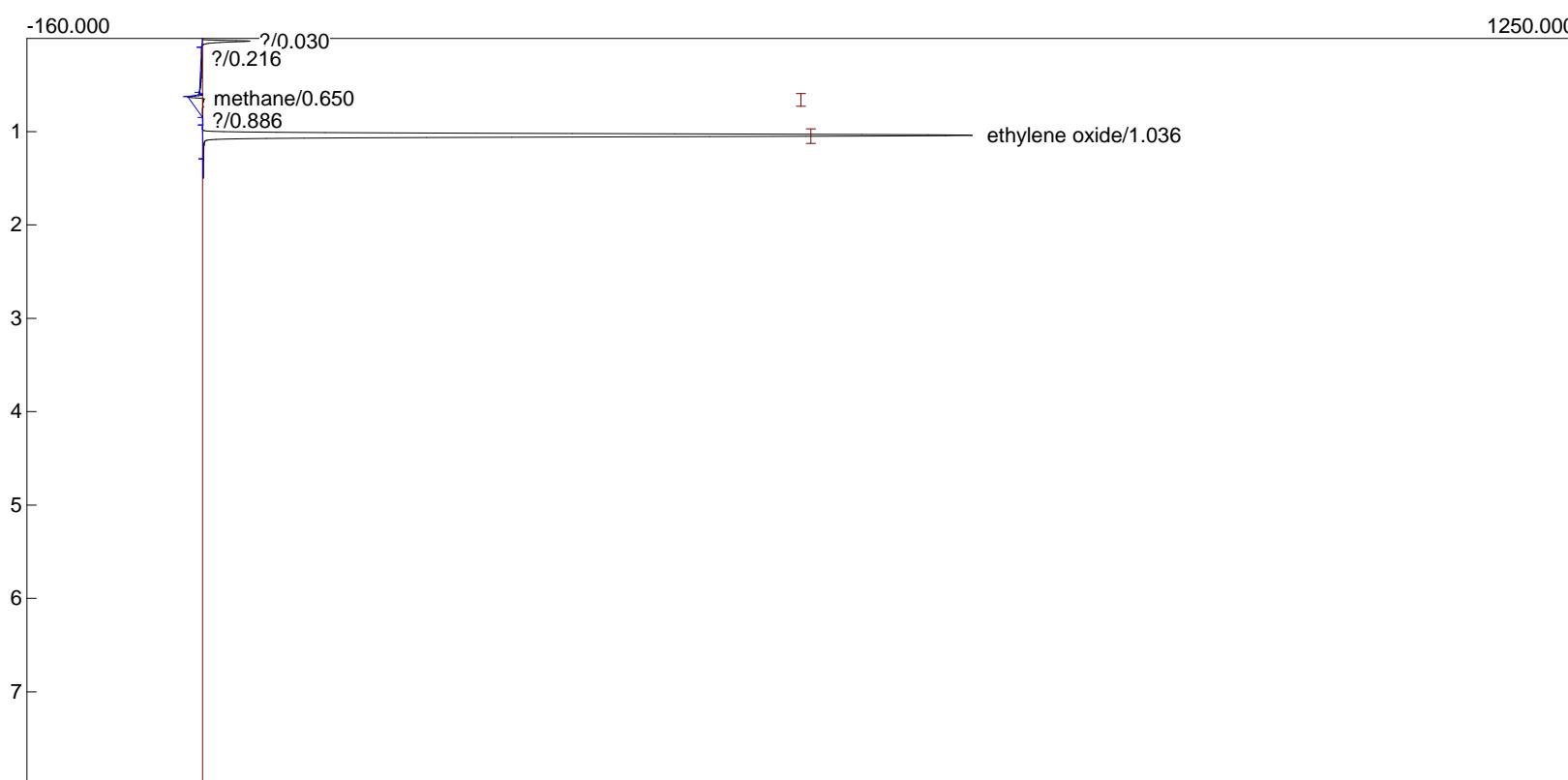
Component	Retention	Area	Height	External	Units
methane	0.603	3.2766	2.159	1.0846	
methane	0.656	81.0428	12.354	26.8275	
ethylene oxide	1.036	7675.5228	3285.673	2103.9882	
		7759.8422		2131.9003	



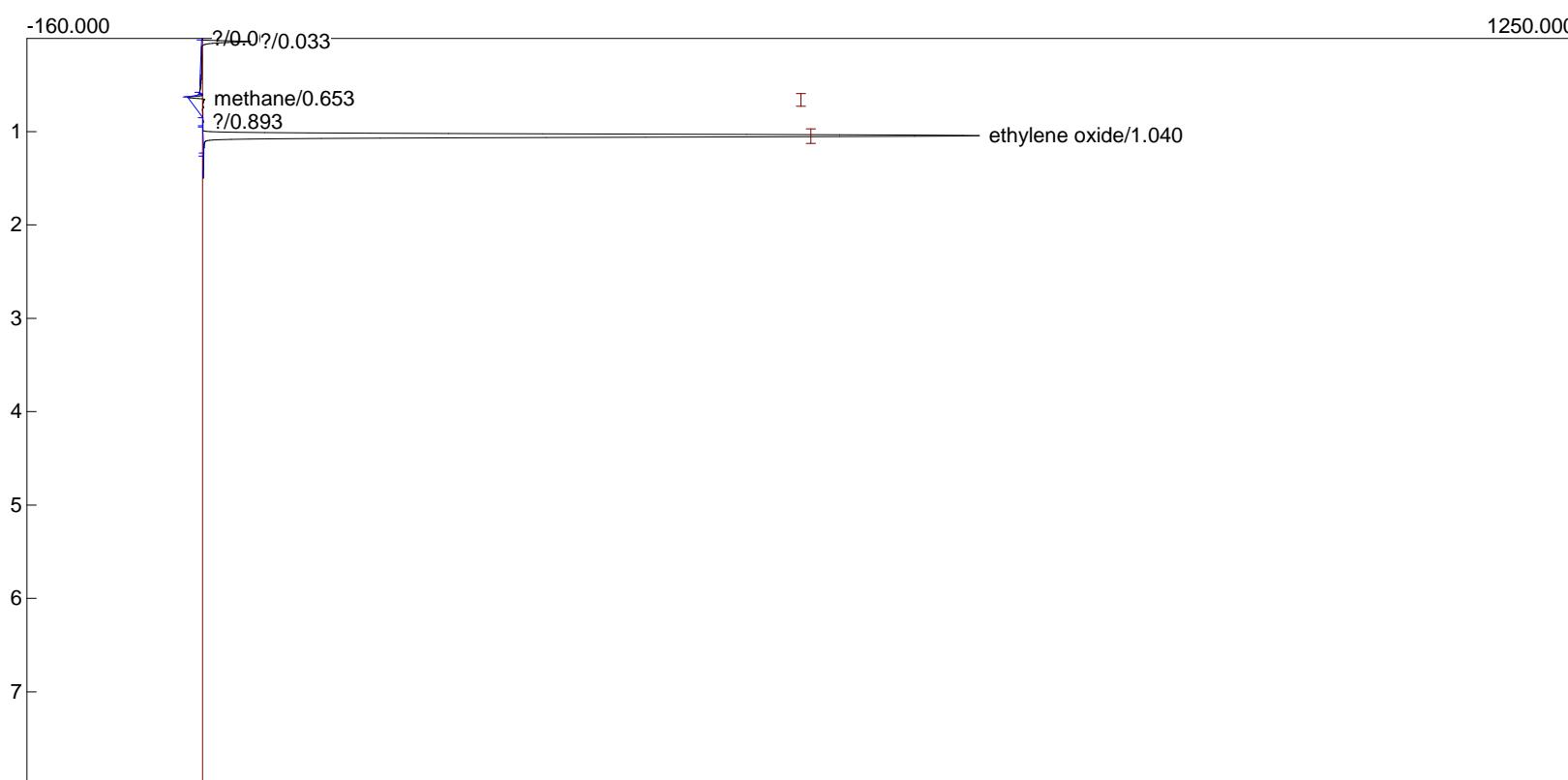
Component	Retention	Area	Height	External	Units
methane	0.603	2.9244	1.560	0.9681	
methane	0.656	80.1768	12.073	26.5408	
ethylene oxide	1.036	7676.5649	3282.399	2104.2738	
		7759.6661		2131.7827	



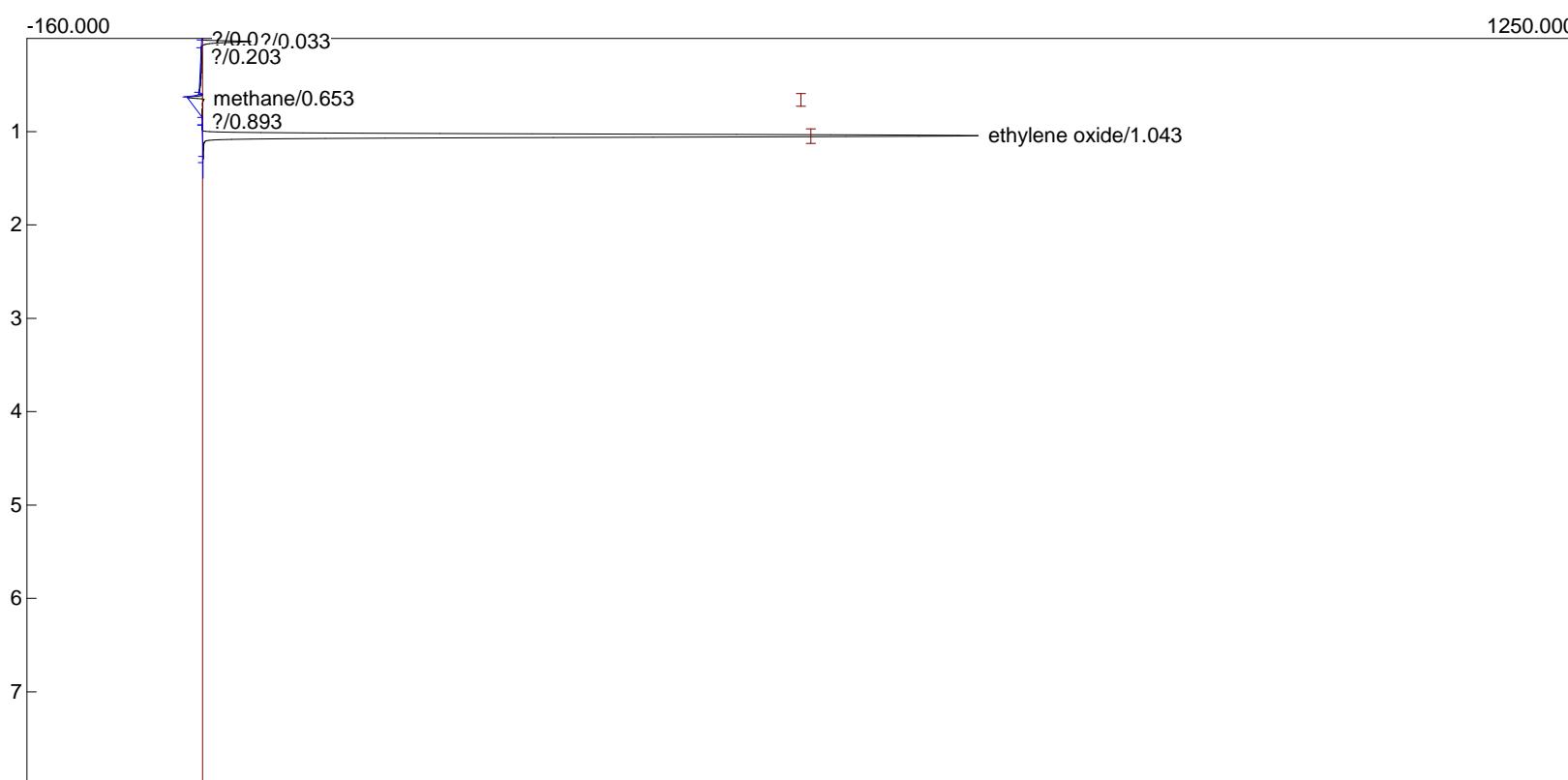
Component	Retention	Area	Height	External	Units
methane	0.660	80.9835	12.320	26.8078	
ethylene oxide	1.040	7683.7442	3287.838	2106.2418	
	7764.7277		2133.0496		



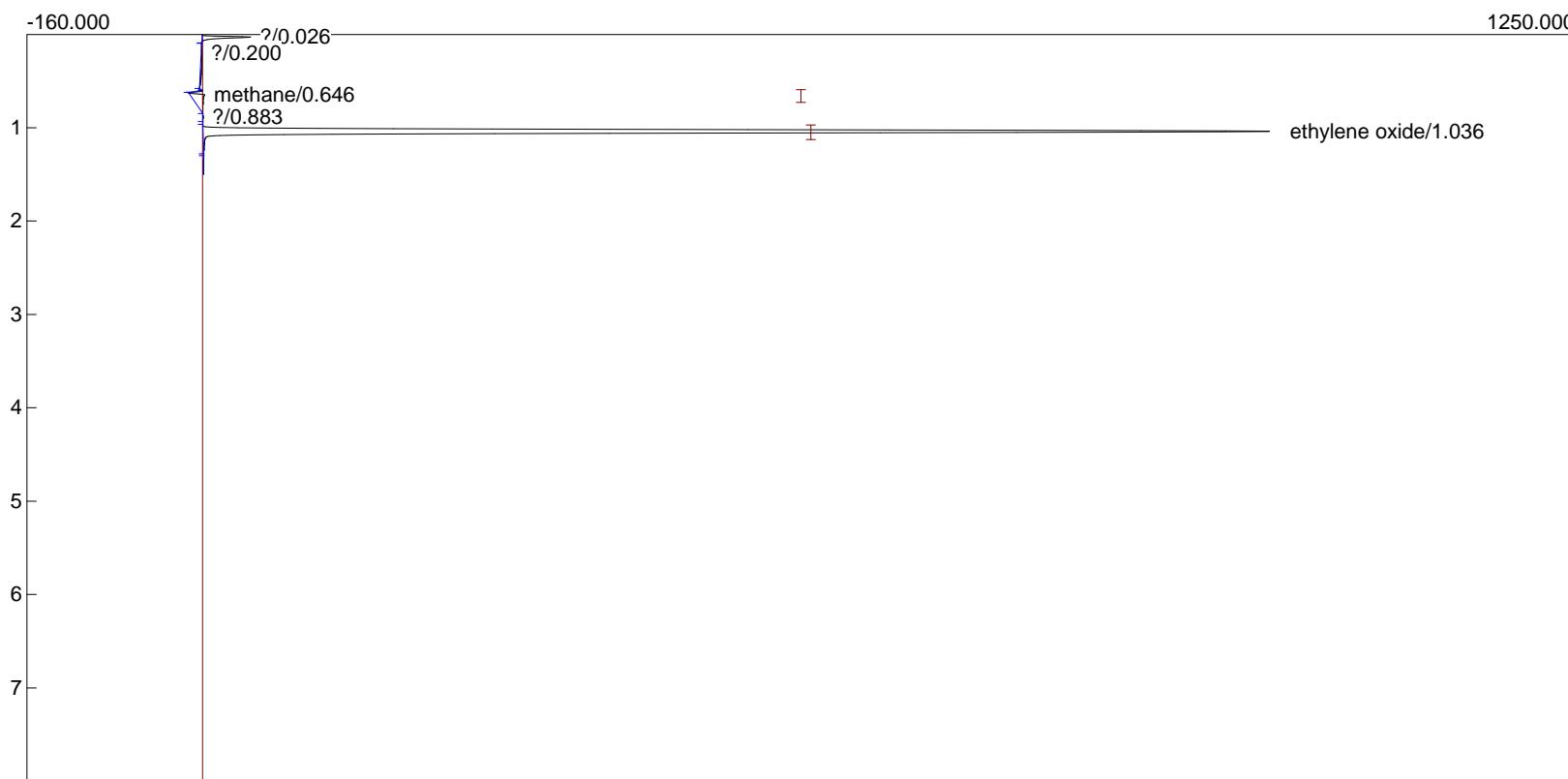
Component	Retention	Area	Height	External	Units
methane	0.650	83.4064	13.792	27.6099	
ethylene oxide	1.036	1629.9447	705.833	446.7949	
		1713.3511		474.4048	



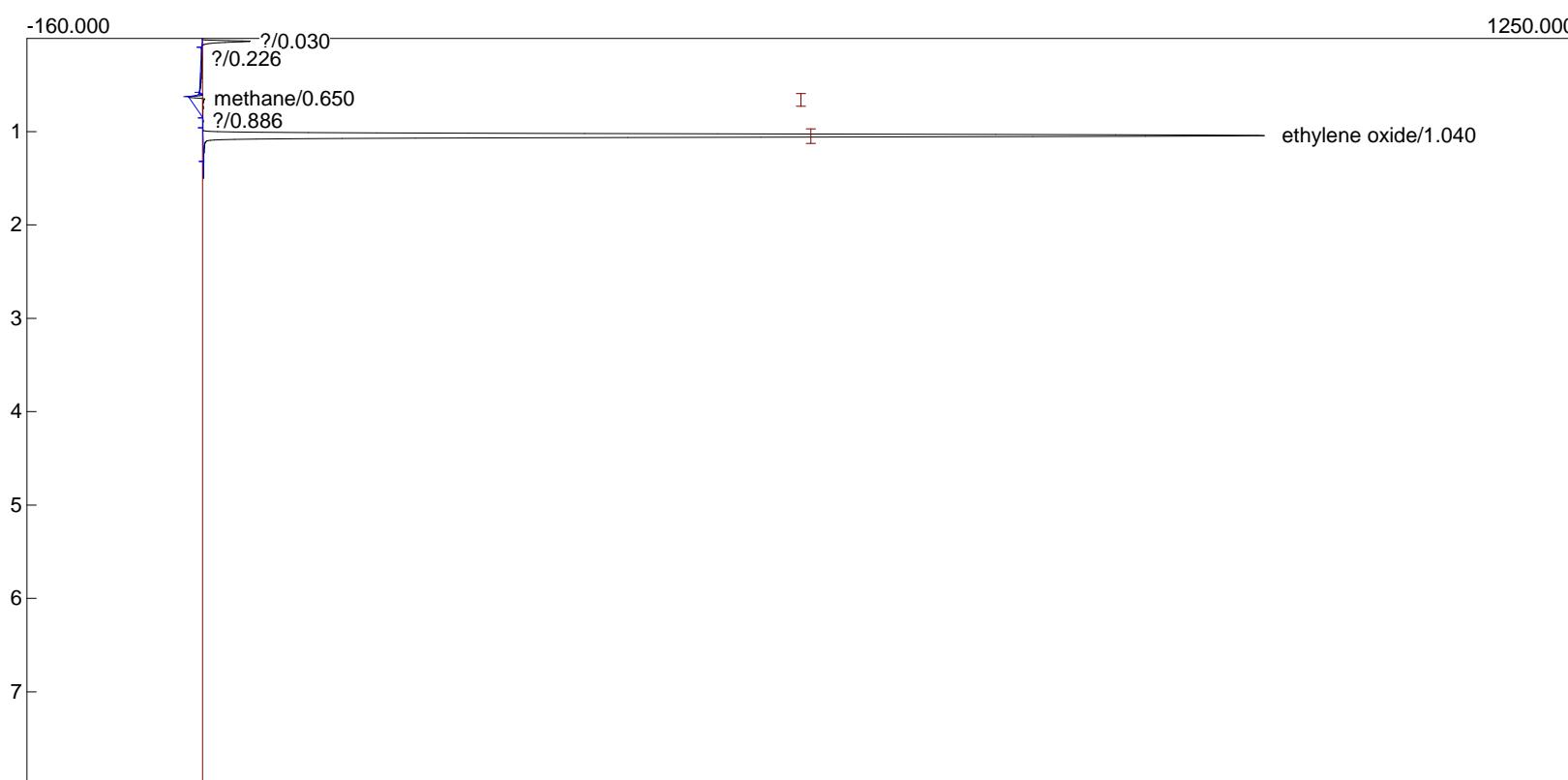
Component	Retention	Area	Height	External	Units
methane	0.653	83.6130	14.024	27.6783	
ethylene oxide	1.040	1640.5566	707.329	449.7038	
		1724.1696		477.3821	



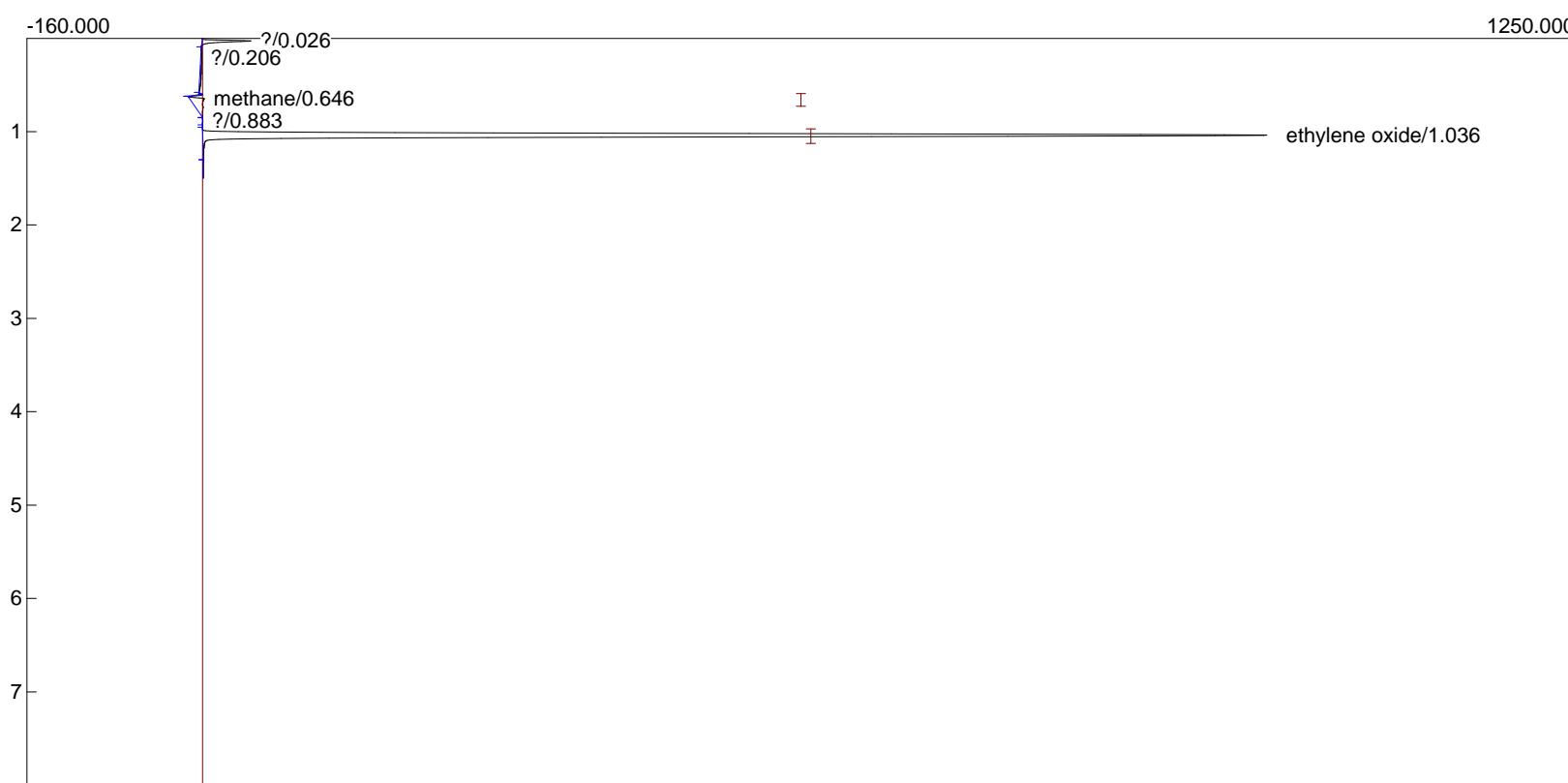
Component	Retention	Area	Height	External	Units
methane	0.653	83.2530	14.128	27.5591	
ethylene oxide	1.043	1639.4194	707.284	449.3921	
		1722.6724		476.9512	



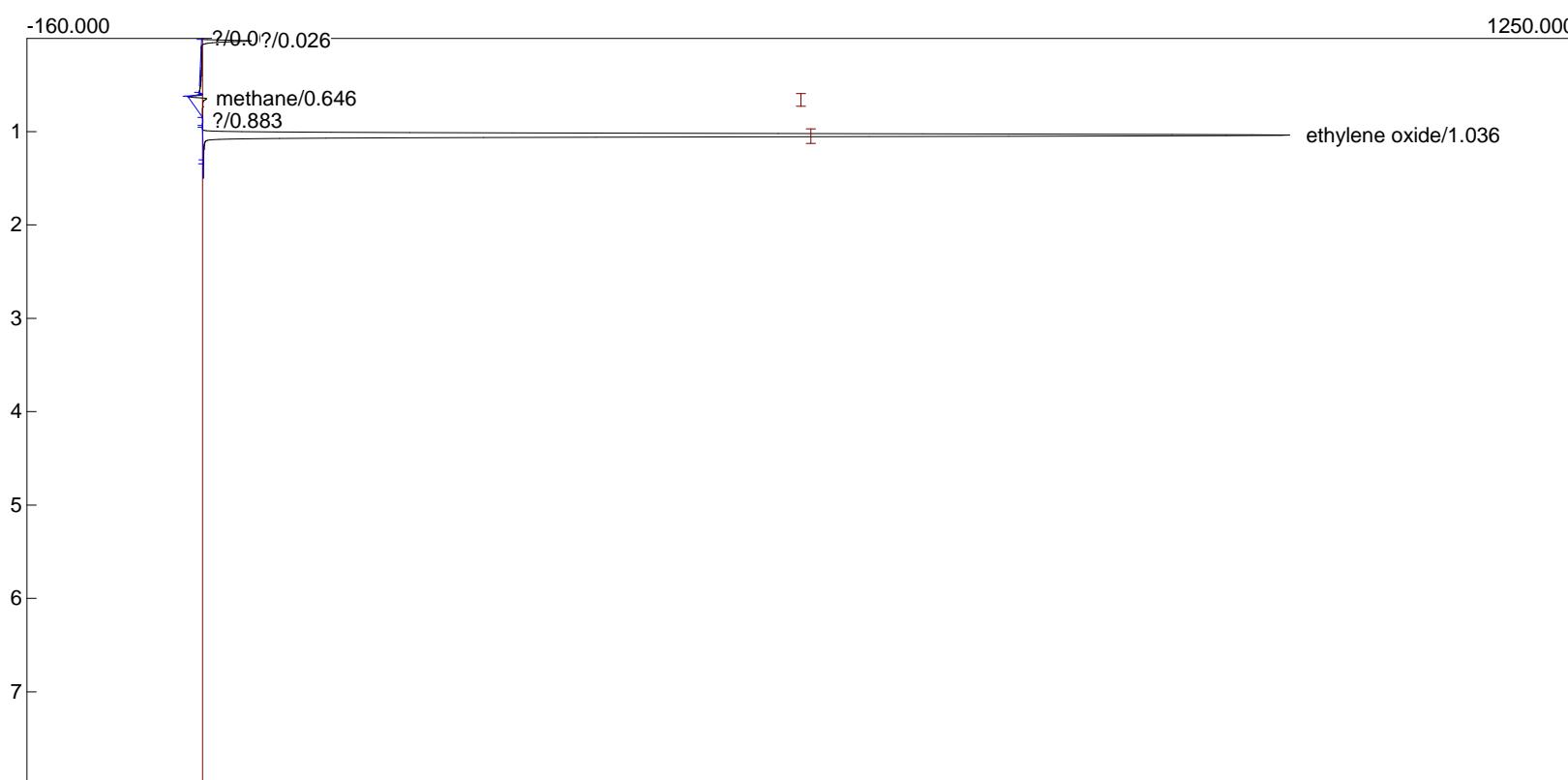
Component	Retention	Area	Height	External	Units
methane	0.646	81.8918	13.645	27.1085	
ethylene oxide	1.036	2272.2170	981.256	622.8524	
		2354.1088		649.9609	



Component	Retention	Area	Height	External	Units
methane	0.650	82.2248	13.600	27.2188	
ethylene oxide	1.040	2255.7184	974.166	618.3298	
		2337.9432		645.5486	

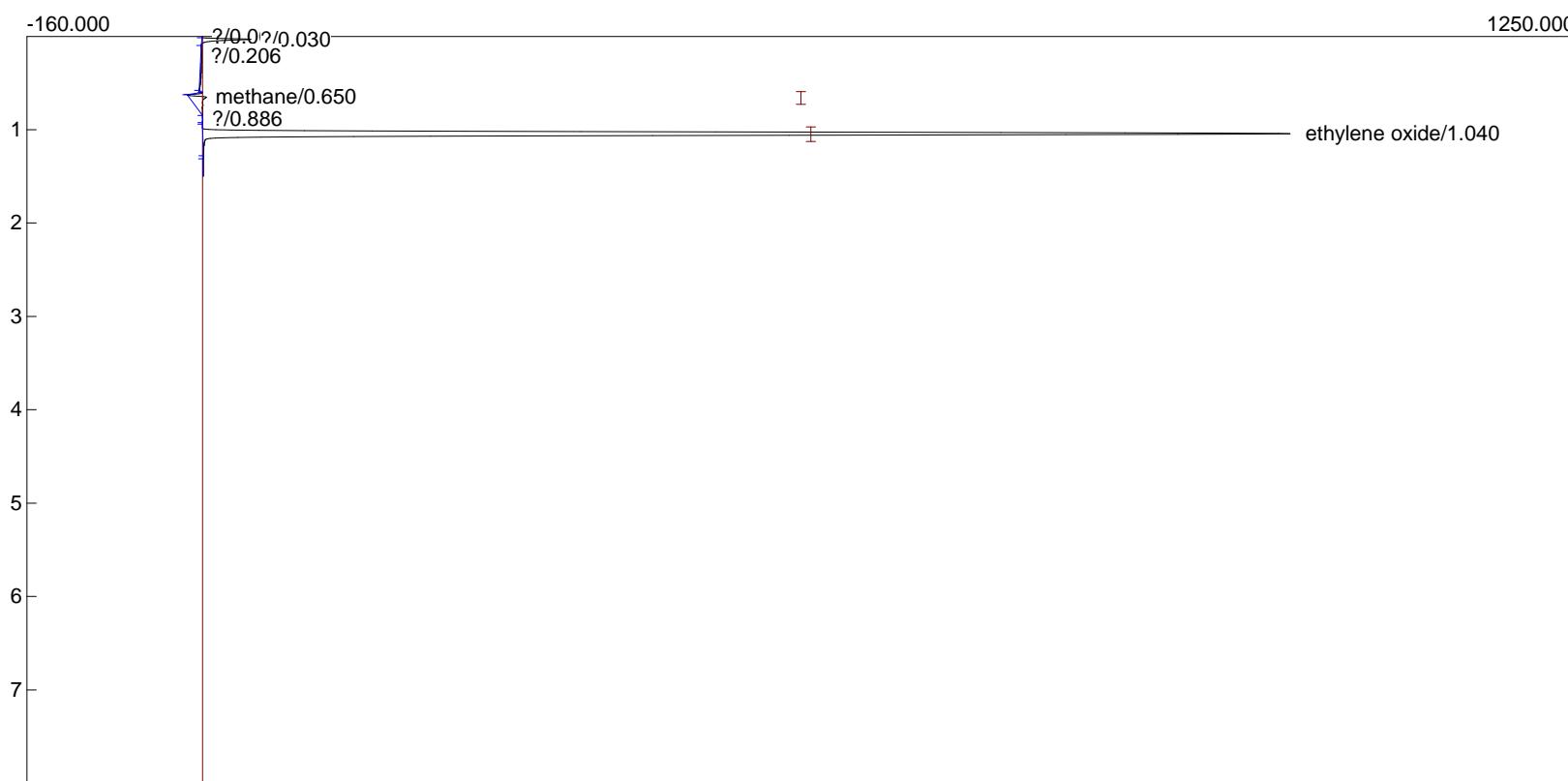


Component	Retention	Area	Height	External	Units
methane	0.646	82.9685	13.562	27.4649	
ethylene oxide	1.036	2261.7535	978.268	619.9842	
		2344.7220		647.4491	

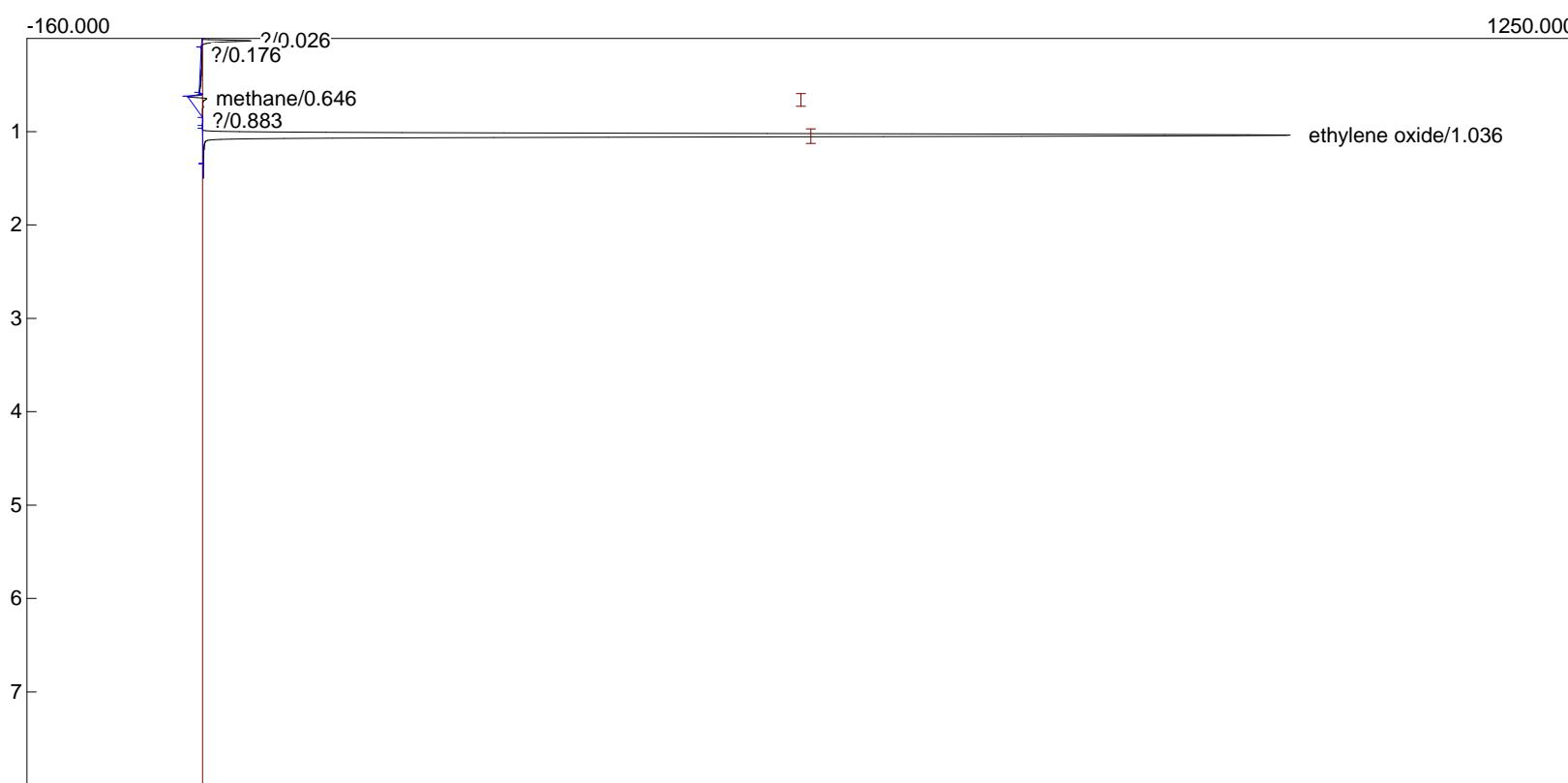


Component	Retention	Area	Height	External	Units
methane	0.646	88.6279	15.858	29.3384	
ethylene oxide	1.036	2309.7806	996.412	633.1492	

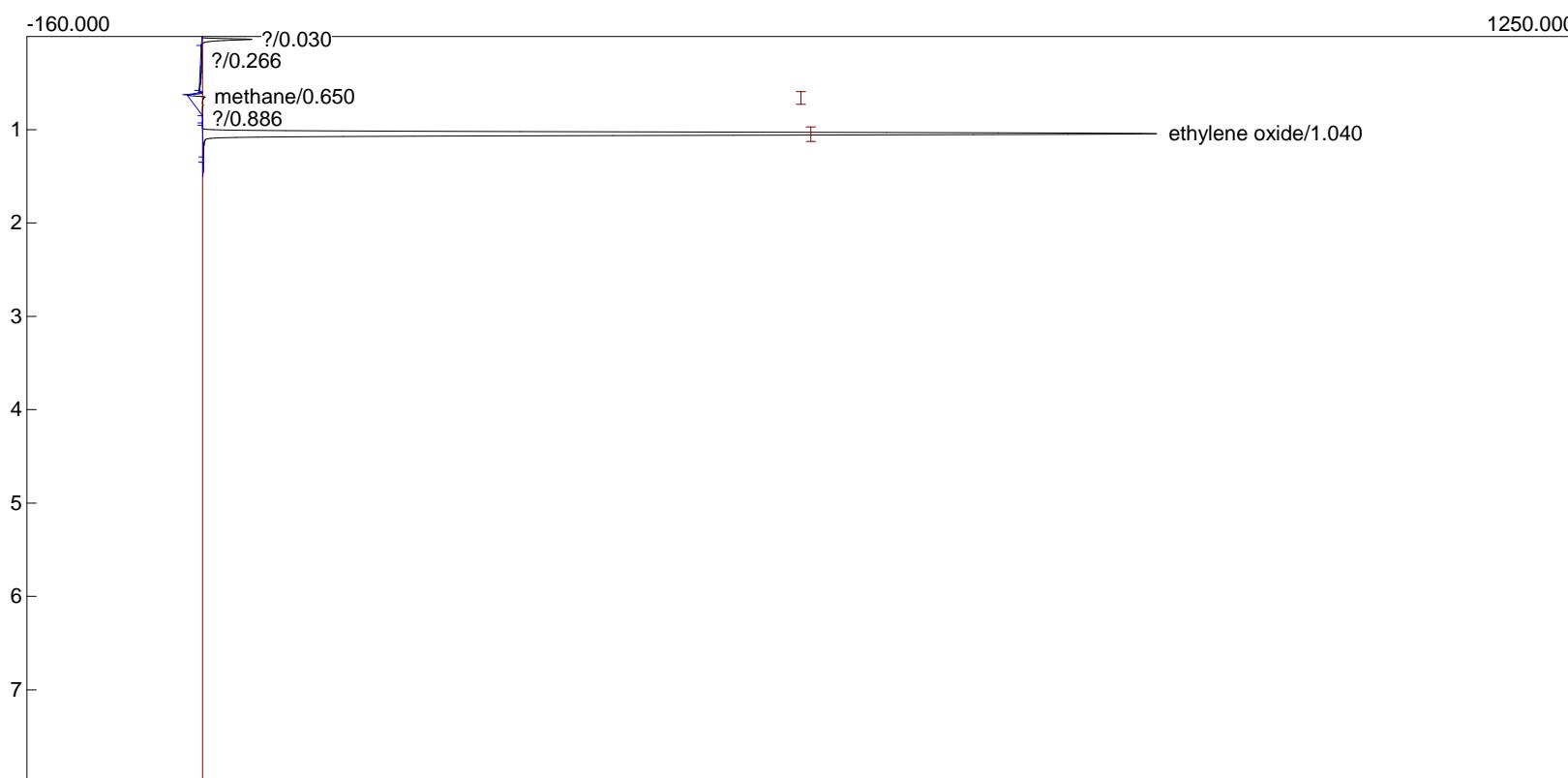
2398.4085 662.4876



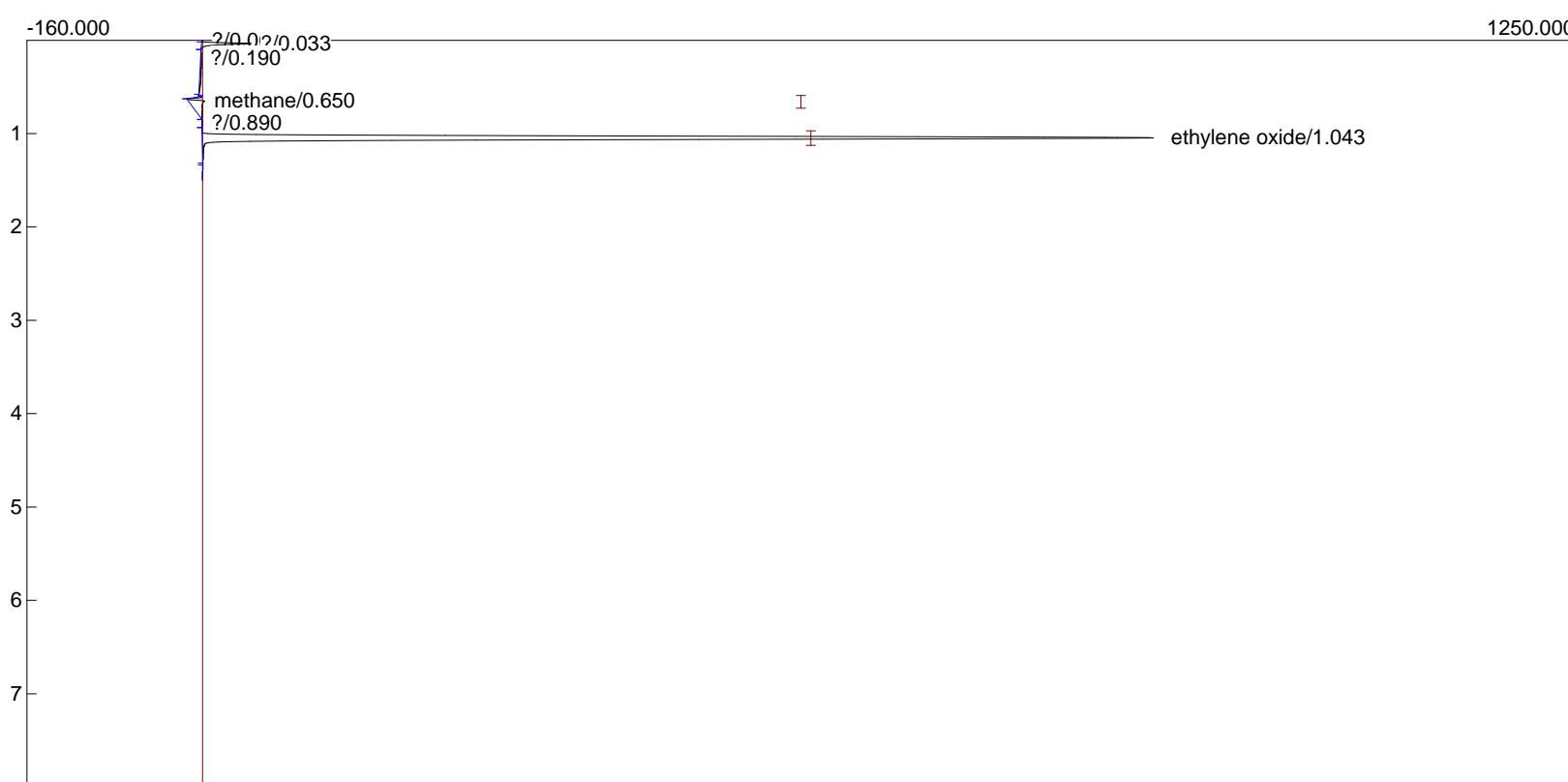
Component	Retention	Area	Height	External	Units
methane	0.650	87.5047	16.008	28.9666	
ethylene oxide	1.040	2309.7610	995.920	633.1438	
		2397.2657		662.1104	



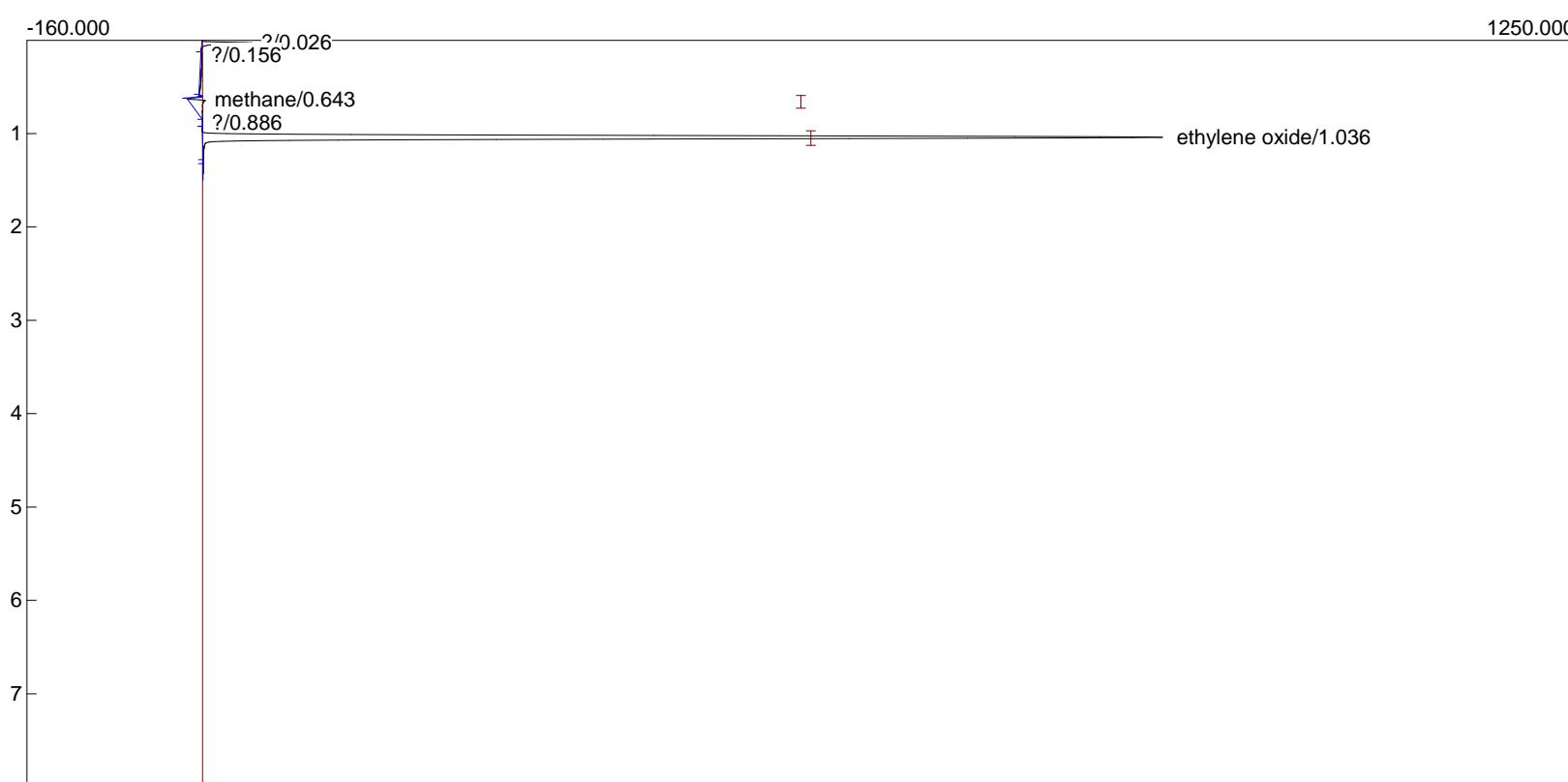
Component	Retention	Area	Height	External	Units
methane	0.646	90.8913	16.110	30.0876	
ethylene oxide	1.036	2317.7689	998.816	635.3389	
		2408.6602		665.4265	



Component	Retention	Area	Height	External	Units
methane	0.650	88.0844	15.024	29.1584	
ethylene oxide	1.040	2027.0740	871.289	555.6546	
		2115.1584		584.8131	



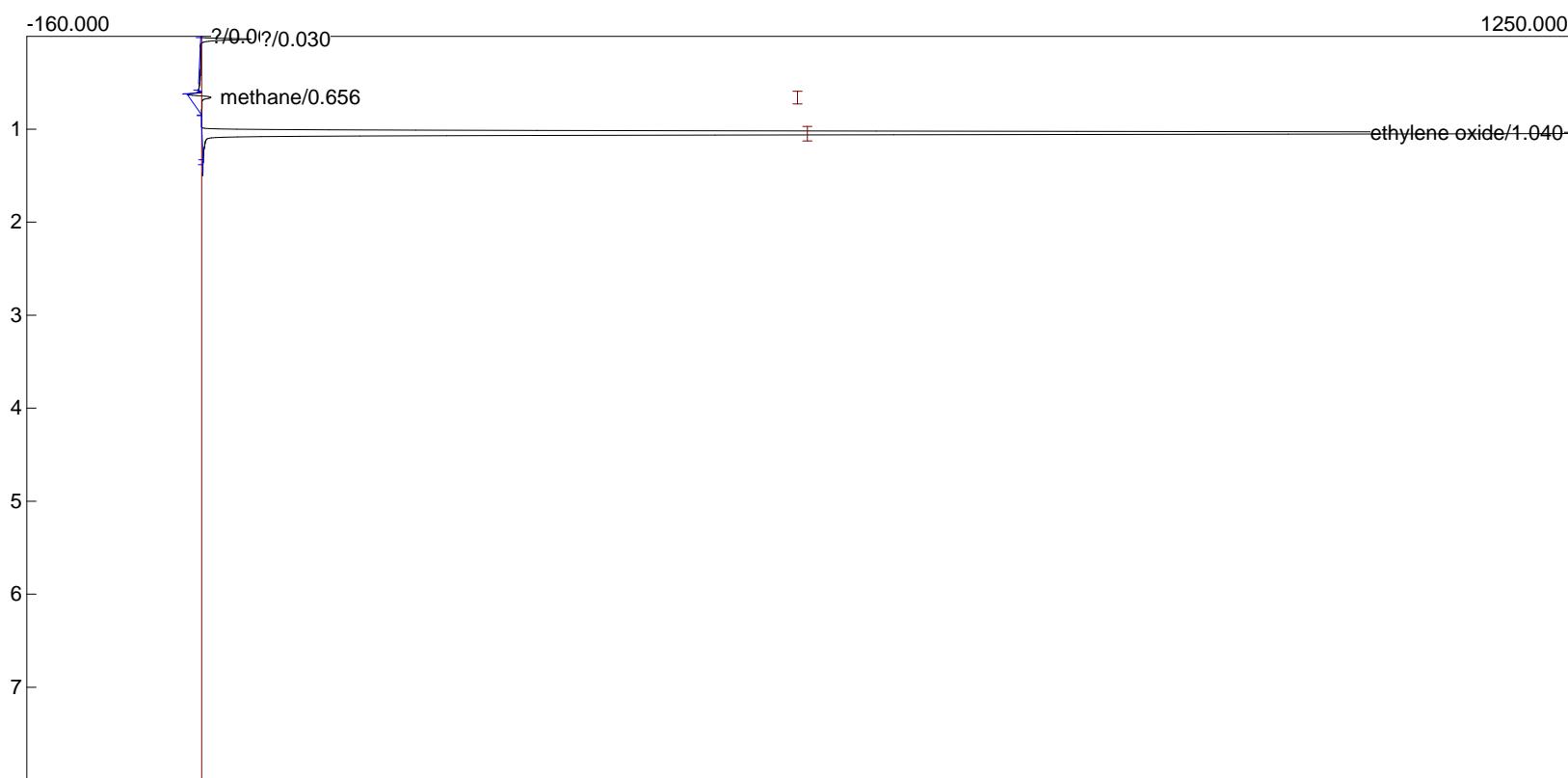
Component	Retention	Area	Height	External	Units
methane	0.650	85.4805	15.236	28.2965	
ethylene oxide	1.043	2028.4188	873.848	556.0233	
		2113.8993		584.3197	



Component	Retention	Area	Height	External	Units
methane	0.643	88.4248	15.429	29.2711	
ethylene oxide	1.036	2043.0026	878.549	560.0209	
		2131.4274		589.2920	

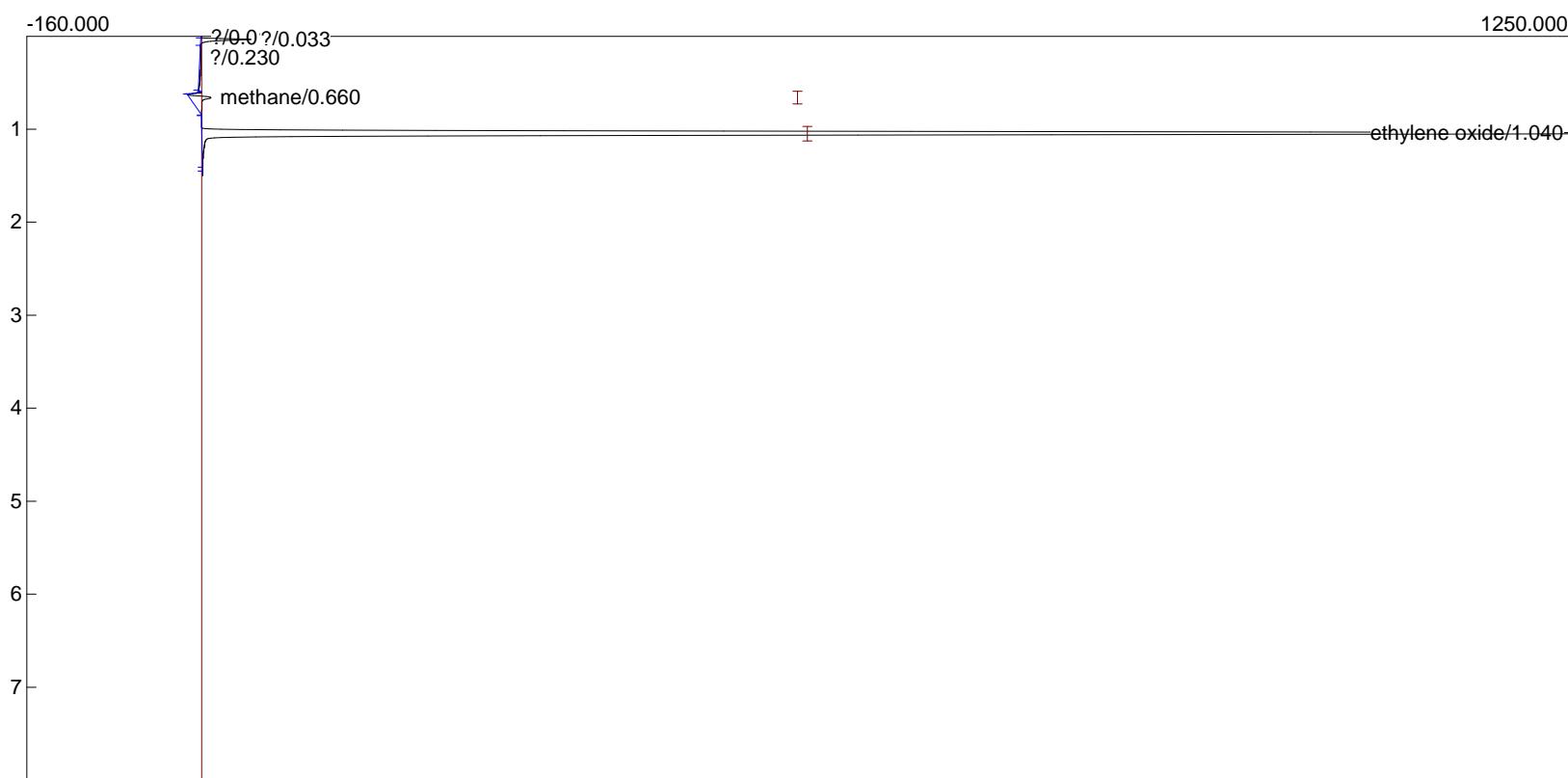


Component	Retention	Area	Height	External	Units
methane	0.660	93.2614	19.539	30.8722	
ethylene oxide	1.040	3309.6116	1409.200	907.2195	
		3402.8730		938.0916	



Component	Retention	Area	Height	External	Units
methane	0.656	93.8622	19.712	31.0711	
ethylene oxide	1.040	3297.5252	1405.320	903.9064	

3391.3874 934.9774



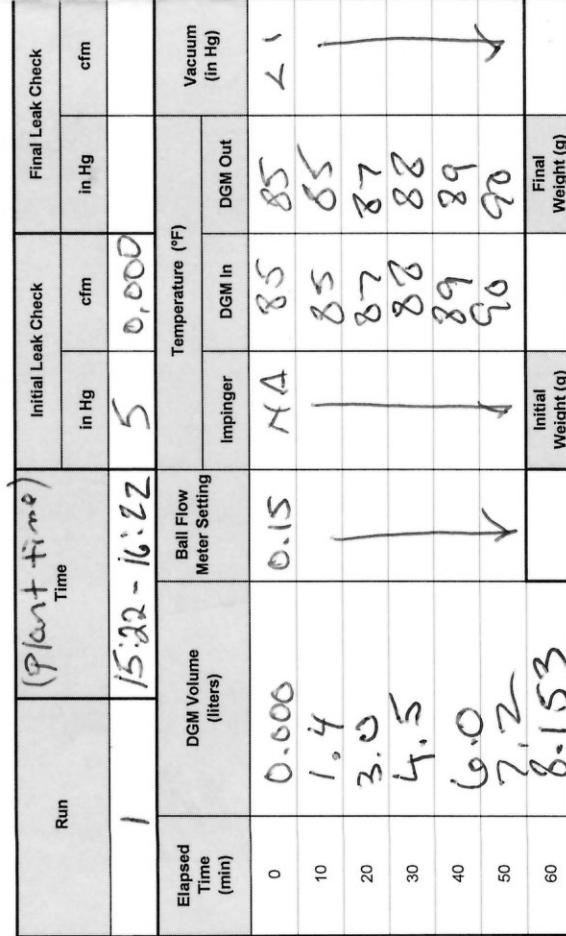
Component	Retention	Area	Height	External	Units
methane	0.660	92.9530	19.617	30.7701	
ethylene oxide	1.040	3294.9381	1405.925	903.1972	

Inlet Tediar Bag

Non-isokinetic Source Sampling Data Sheet

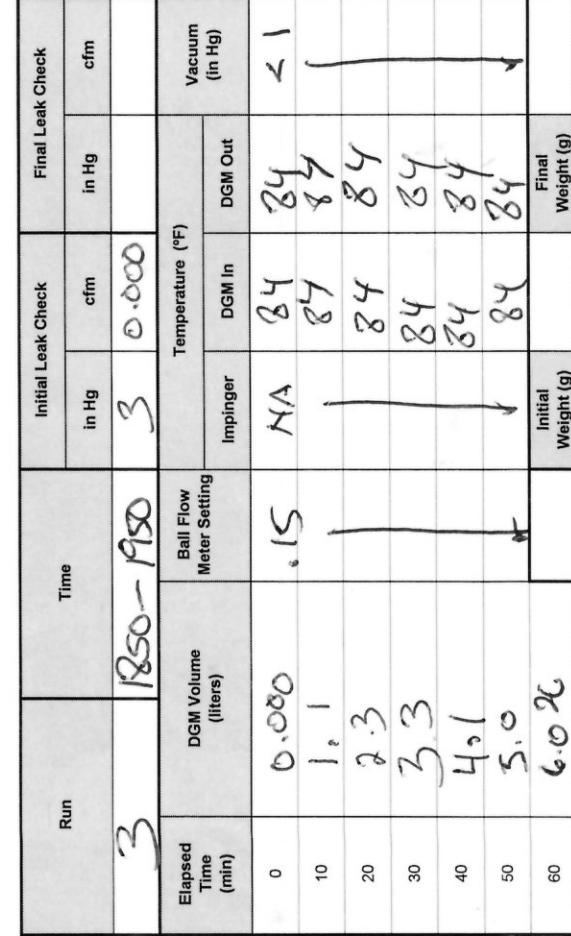
Project			Source			Dry Gas Meter			Barometric Pressure (in Hg)			Date			Operators	
ID	Client	Facility	ID	Location	ID	ΔH @	Y	ID	ΔH @	Y	ID	ΔH @	Y	ID	ΔH @	Y
Dividien	Hawen	Inlet	V2060	Before	—	1.0061	30.11	8-10-16	TC/EB/MM							

ID	Run	(Plant) Time	Initial Leak Check	Final Leak Check	Time	Run	Initial Leak Check	Final Leak Check	Time	Run	Initial Leak Check	Final Leak Check	Time	Run	Initial Leak Check	Final Leak Check	
	1	15:22 - 16:22	5	0,000		2	16:54 - 17:54	3	0,000	2	17:44	91	91	< 1			



ID	Run	Ball Flow Meter Setting	Temperature (°F)	Impinger	DGM In	DGM Out	Vacuum (in Hg)	Time	Run	Ball Flow Meter Setting	Temperature (°F)	Impinger	DGM In	DGM Out	Vacuum (in Hg)
	1	0.15	74	85	85	85	2.1		2	.15	74	91	91	91	< 1

ID	Run	Ball Flow Meter Setting	Temperature (°F)	Impinger	DGM In	DGM Out	Vacuum (in Hg)	Time	Run	Ball Flow Meter Setting	Temperature (°F)	Impinger	DGM In	DGM Out	Vacuum (in Hg)
	3	0.15	73	87	87	87	2.4		4	.15	73	92	92	92	1



ID	Run	Ball Flow Meter Setting	Temperature (°F)	Impinger	DGM In	DGM Out	Vacuum (in Hg)	Time	Run	Ball Flow Meter Setting	Temperature (°F)	Impinger	DGM In	DGM Out	Vacuum (in Hg)
	3	0.15	73	84	84	84	2.1		4	.15	73	95	95	95	1

Flow Data

CAT Ox Inlet

lot 2

Notes:

Flow Data

CATOx Inlet

2 of 2

Project			Source		Pitot Tube			Date	Operators	
Id	Client	Facility	Id	Location	Leak Check	Id	Cp			
CO20162	Loviden		oxidizer	inlet	+ -	4-1	0.84	8-10-16	EB/mm	
Run	Time	Static (in H ₂ O)	Run	Time	Static (in H ₂ O)	Run	Time	Static (in H ₂ O)	Run	Time
4	200-205	-30								
Traverse Point	Pitot Δ P (in H ₂ O)	Stack Temp (°F)	Traverse Point	Pitot Δ P (in H ₂ O)	Stack Temp (°F)	Traverse Point	Pitot Δ P (in H ₂ O)	Stack Temp (°F)	Traverse Point	Pitot Δ P (in H ₂ O)
1	0.37	87								
2	0.44	88								
3	0.44	89								
4	0.43	90								
5	0.43	90								
6	0.42	91								
1	0.43	90								
2	0.45	91								
3	0.47	91								
4	0.46	91								
5	0.46	91								
6	0.45	92								

Notes:

APPENDIX C

SECONDARY AERATION EMISSIONS TEST DATA

Covidien - North Haven
Secondary Aeration Stack (stack)

EPA 1,2,18
Summary Table

Canomara LLC
Source Testing Services

Item	Description	Run 1	Run 2	Run 3	Average	Compliance
Date	Test Date	8/11/2016	8/11/2016	8/11/2016		
Start	Run Start Time	9:15	10:17	11:19		
Finish	Run Finish Time	10:15	11:17	12:19		
θ	Net Run Time, minutes	60.0	60.0	60.0	60.0	
N_{tp}	Net Traversing Points	16	16	16	16	
D_N	Nozzle Diameter, inches	0.000	0.000	0.000		
C_p	Pitot Tube Coeficient	0.840	0.840	0.840	0.840	
Y	Dry Gas Meter Calibration Factor	1.000	0.000	0.000	0.333	
ΔH_{\circ}	Dry Gas Meter Orifice Constant	1.800	0.000	0.000	0.600	
P_{Br}	Barometric Pressure, inches of Mercury	30.09	30.09	30.09	30.09	
% H_2O_{calc}	Calculated Moisture Content of Stack Gas, %	2.2	2.3	2.3	2.3	
M_{fd}	Dry Mole Fraction	0.978	0.977	0.977	0.977	
%CO ₂	Carbon Dioxide, %	0.00	0.00	0.00		
%O ₂	Oxygen, %	20.90	20.90	20.90	20.90	
% CO + N ₂	Carbon Monoxide & Nitrogen, %	79.1	79.1	79.1	79.1	
M_d	Dry Molecular Weight, lb/lb-Mole	28.84	28.84	28.84	28.84	
M_s	Wet Molecular Weight, lb/lb-Mole	28.60	28.59	28.59	28.59	
P_g	Flue Gas Static Pressure, inches of H_2O	-2.00	-2.00	-2.00	-2.00	
P_s	Absolute Flue Gas Pressure, inches of Mercury	29.94	29.94	29.94	29.94	
T_s	Average Stack Gas Temperature, °F	89.4	98.6	98.6	95.5	
Avg $\sqrt{\Delta P}$	Average Square Root Velocity Head, inches of H_2O	0.756	0.801	0.779	0.779	
A_s	Stack Crossectional Area, square feet	4.3	4.3	4.3	4.3	
FLOW						
V_s	Average Stack Gas Velocity, fps	43.5	46.5	45.2	45.1	
V_s (fpm)	Average Stack Gas Velocity, fpm	2,610	2,788	2,713	2,704	
Q_{aw}	Actual Wet Volumetric Flue Gas Flow Rate, acfm	11,162	11,924	11,602	11,562	
Q_{sw}	Standard Wet Volumetric Flue Gas Flow Rate, scfm	10,736	11,279	10,974	10,996	
Q_{sw} (scfh)	Standard Wet Volumetric Flue Gas Flow Rate, scfh	644,133	676,723	658,434	659,763	
Q_{sd}	Standard Dry Volumetric Flow Rate, dscfm	10,497	11,020	10,722	10,746	
Q_{sd} (dscfh)	Standard Dry Volumetric Flow Rate, dscfh	629,830	661,189	643,320	644,779	
ETHYLENE OXIDE						
EO _{ppm}	Ethylene Oxide Concentration, ppm-wet	0.32	0.29	0.27	0.29	
EO _{lb/hour}	Ethylene Oxide Emission Rate, lb/hour	0.024	0.022	0.020	0.022	

Secondary Aeration Method 18 Data**11-Aug-16****Covidien****Run 1**

Compound	Concentration (ppm)				Deviation			Recovery	Corrected (ppm)
	1	2	3	Average					
EO	0.3095	0.3236	0.2995	0.3109	0.4%	-4.1%	3.7%	0.98	0.32

Run 2

Compound	Concentration (ppm)				Deviation			Recovery	Corrected (ppm)
	1	2	3	Average					
EO	0.2947	0.2916	0.2726	0.2863	-2.9%	-1.9%	4.8%	0.98	0.29

Run 3

Compound	Concentration (ppm)				Deviation			Recovery	Corrected (ppm)
	1	2	3	Average					
EO	0.2873	0.2686	0.2522	0.269	-6.7%	0.3%	6.4%	0.98	0.27

Oxidizer Outlet Method 18 Initial Calibration**10-Aug-16****Covidien****Standards**

	Low	Mid		High
Cylinder ID	EA0011747	EA0011733		EA0077506
Expiration Date	5/21/2017	5/21/2017		5/21/2017
EO (ppm)	1.0	5.00		10.0

High

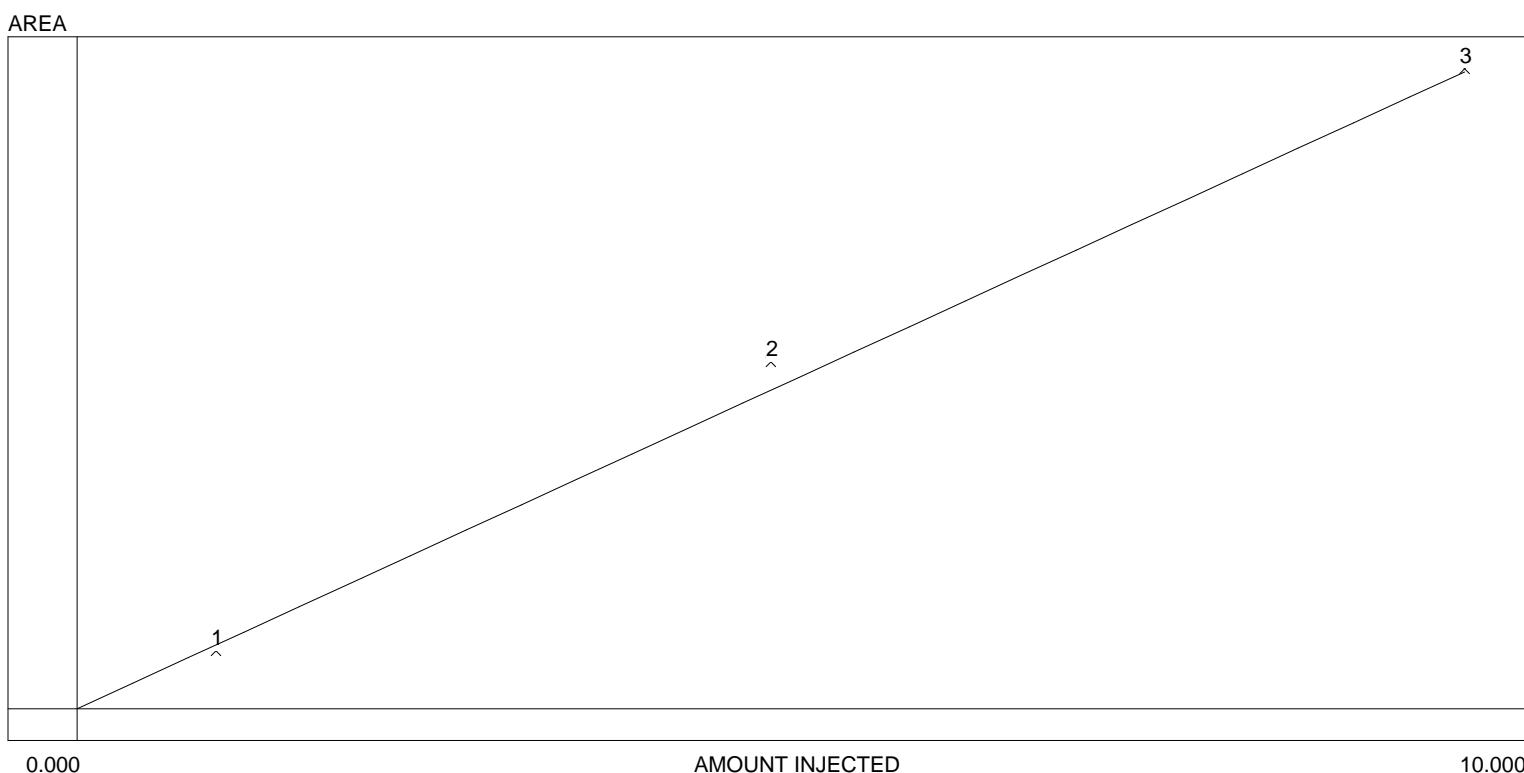
Compound	Conc	Injection									Average	
		20			21			22				
		Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc
EO	10.00	29.03	10.07	-0.21%	29.01	10.06	-0.17%	28.85	10.01	0.38%	28.97	10.05

Mid

Compound	Conc	Injection									Average	
		17			18			19				
		Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc
EO	5.00	15.76	5.47	-0.42%	15.61	5.41	0.54%	15.72	5.45	-0.13%	15.70	5.44

Low

Compound	Conc	Injection									Average	
		10			11			12				
		Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc
EO	1.00	2.67	0.92	-1.96%	2.58	0.89	1.48%	2.60	0.90	0.47%	2.61	0.91



Lvl.	Area/ht.	Amount	CF	Current	Previous #1	Previous #2
1	2.614	1.000	2.614	2.665	2.575	2.601
2	15.695	5.000	3.139	15.761	15.610	15.715
3	28.965	10.000	2.897	29.028	29.015	28.854

Secondary Aeration Method 18 Recovery Study**11-Aug-16****Covidien****Recovery Summary**

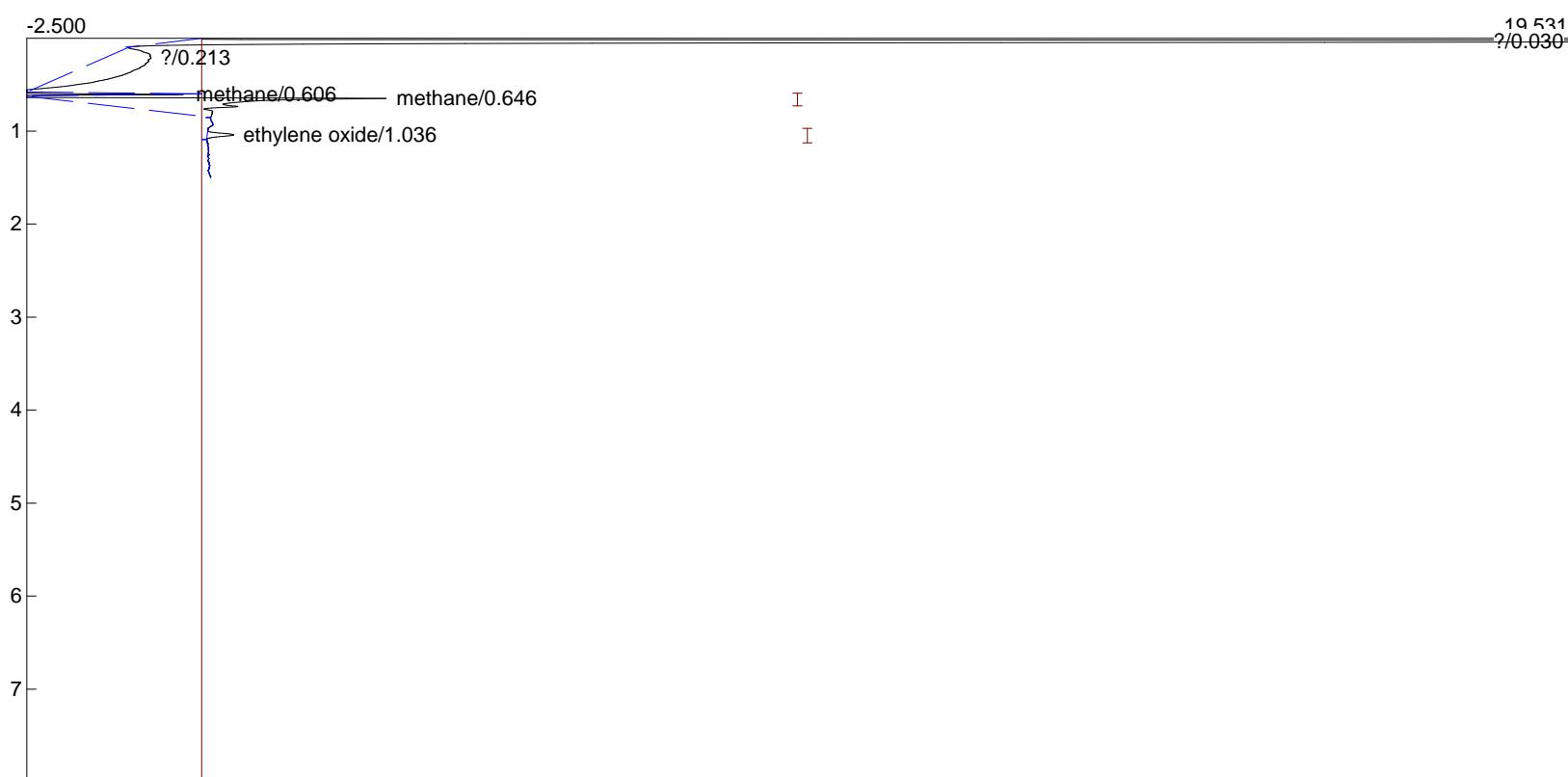
Compound	Sample ID	Sample Volume (ml)	(u) Un-Spiked Sample Response (ppm)	Sample Mass	Standard Volume (ml)	Standard Conc (ppm)	Standard Mass	Spiked Bag Total Conc (ppm)	(s) Theoretical Spike Conc (ppm)	(t) Spiked Sample Response (ppm)	(t-u)/s Recovery (%)
EO	2	6684	0.2863	1914	400	98.9	39560	5.85	5.57	5.75	98%

Spiked Sample Analysis

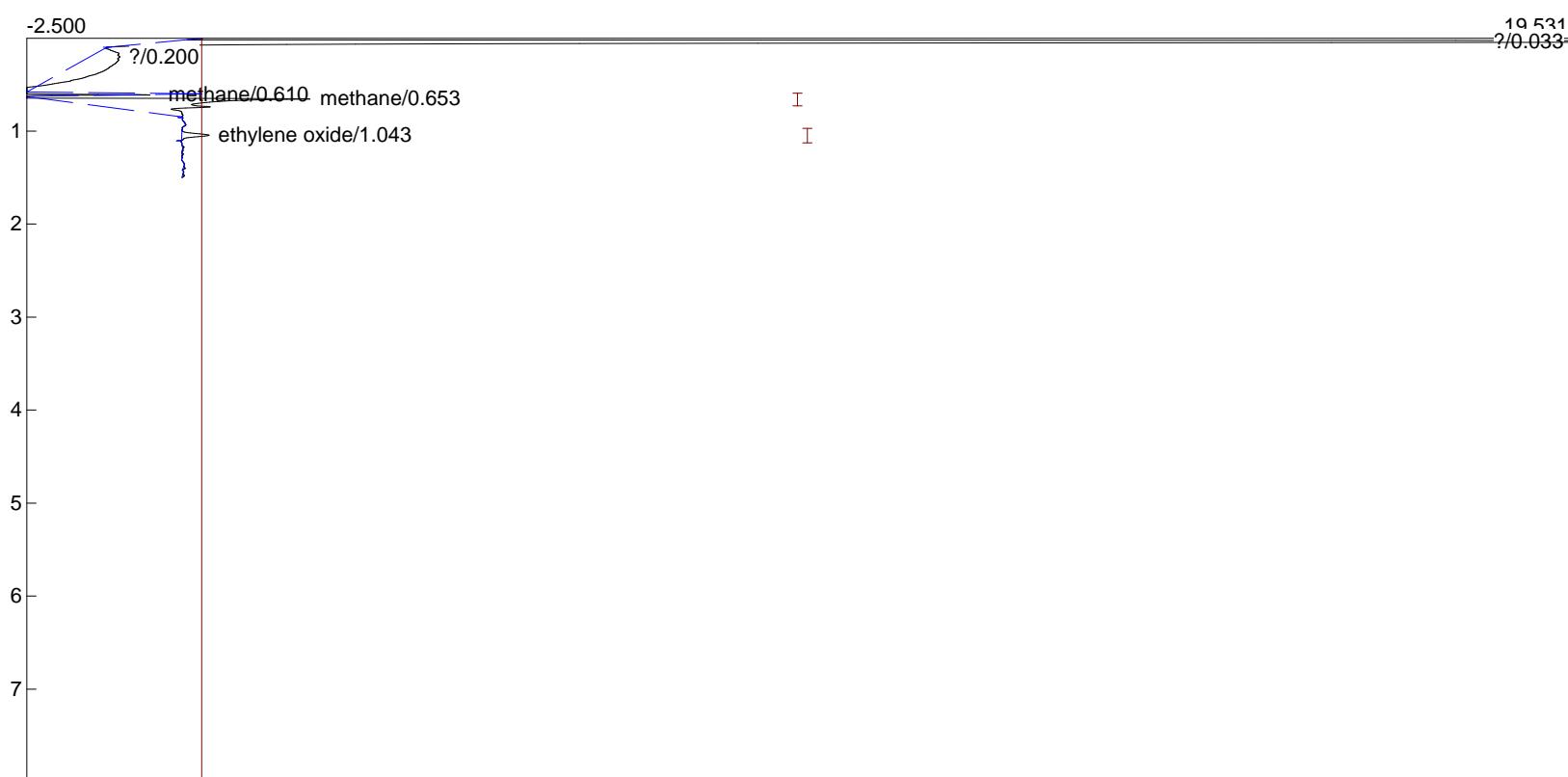
Compound	Concentration (ppm)				Deviation		
	1	2	3	average (t)			
EO	5.8349	5.7627	5.6574	5.7517	-1.4%	-0.2%	1.6%

Secondary Aeration Method 18 Post Test Calibration**11-Aug-16****Covidien****Mid Post Cal**

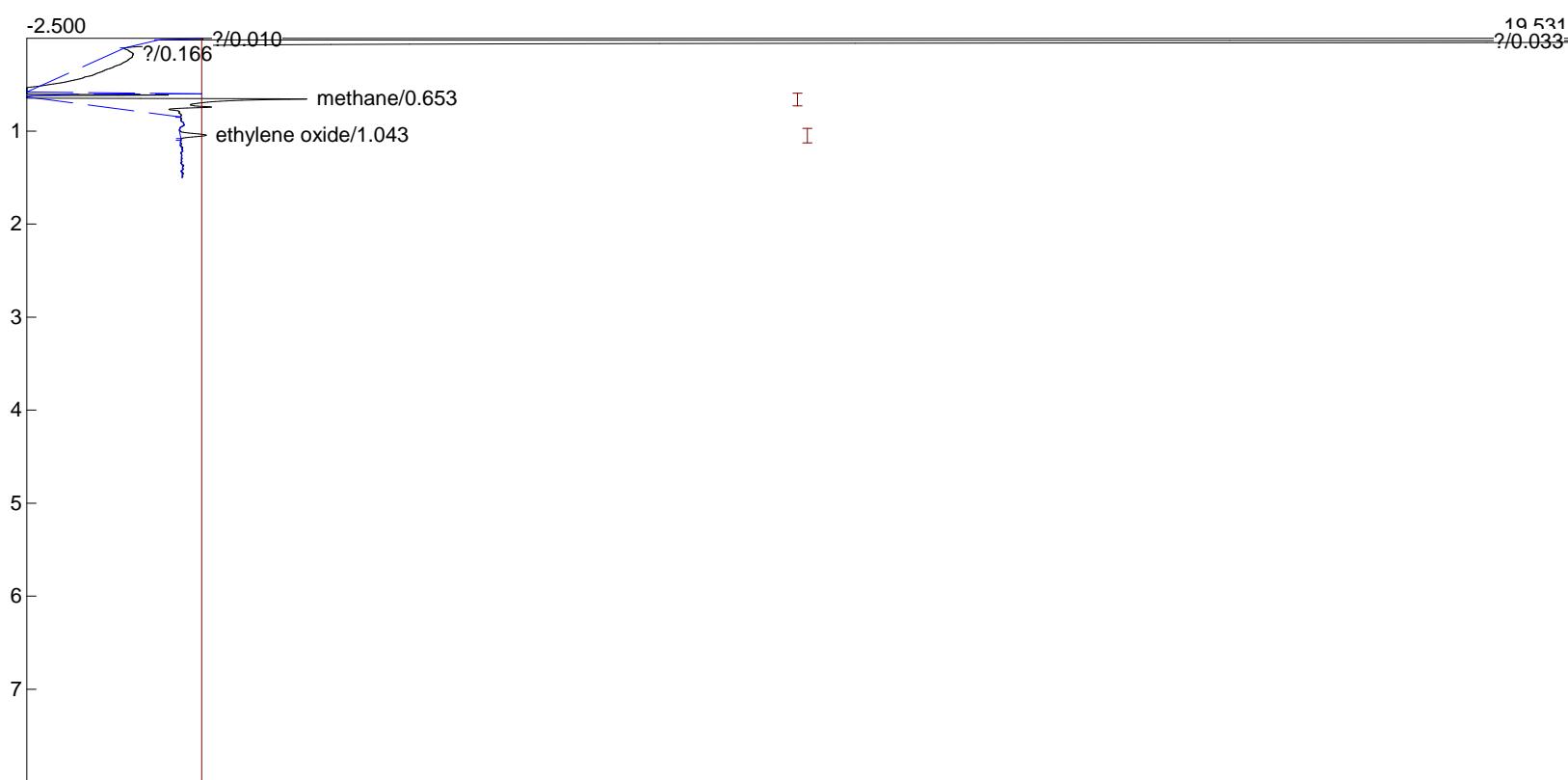
Compound	Conc	Injection										Average		Accuracy	Drift		
		1			2			3									
		Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc	% Dev	Area	Conc					
EO	5.00	15.1908	5.2688	-0.1%	15.1826	5.266	0.0%	15.1634	5.2593	0.1%	15.18	5.26	5.29	-3.40%			



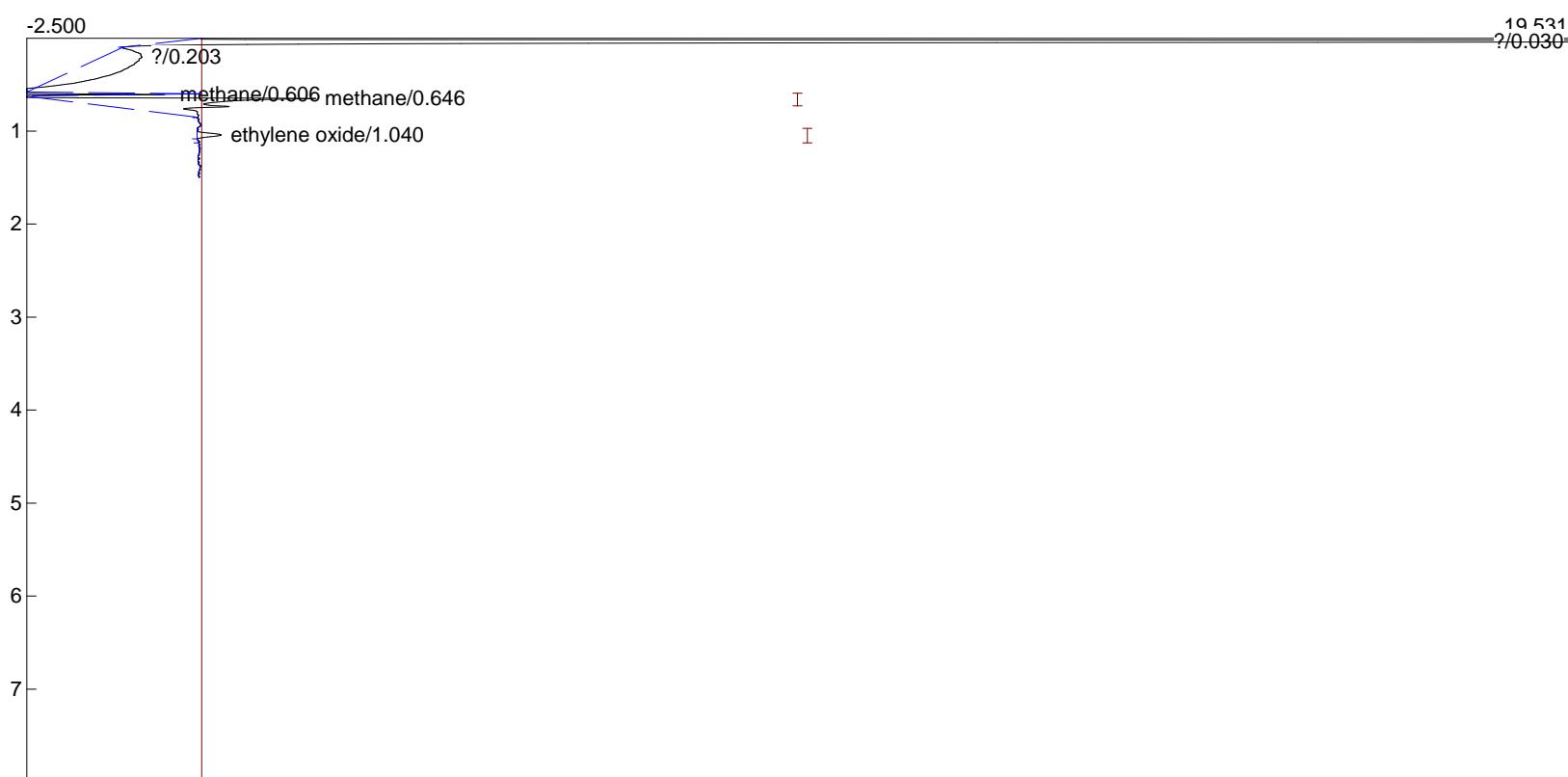
Component	Retention	Area	Height	External	Units
methane	0.606	3.8674	3.539	1.2802	
methane	0.646	90.4494	15.391	29.9413	
ethylene oxide	1.036	0.8922	0.382	0.3095	
			95.2090	31.5310	



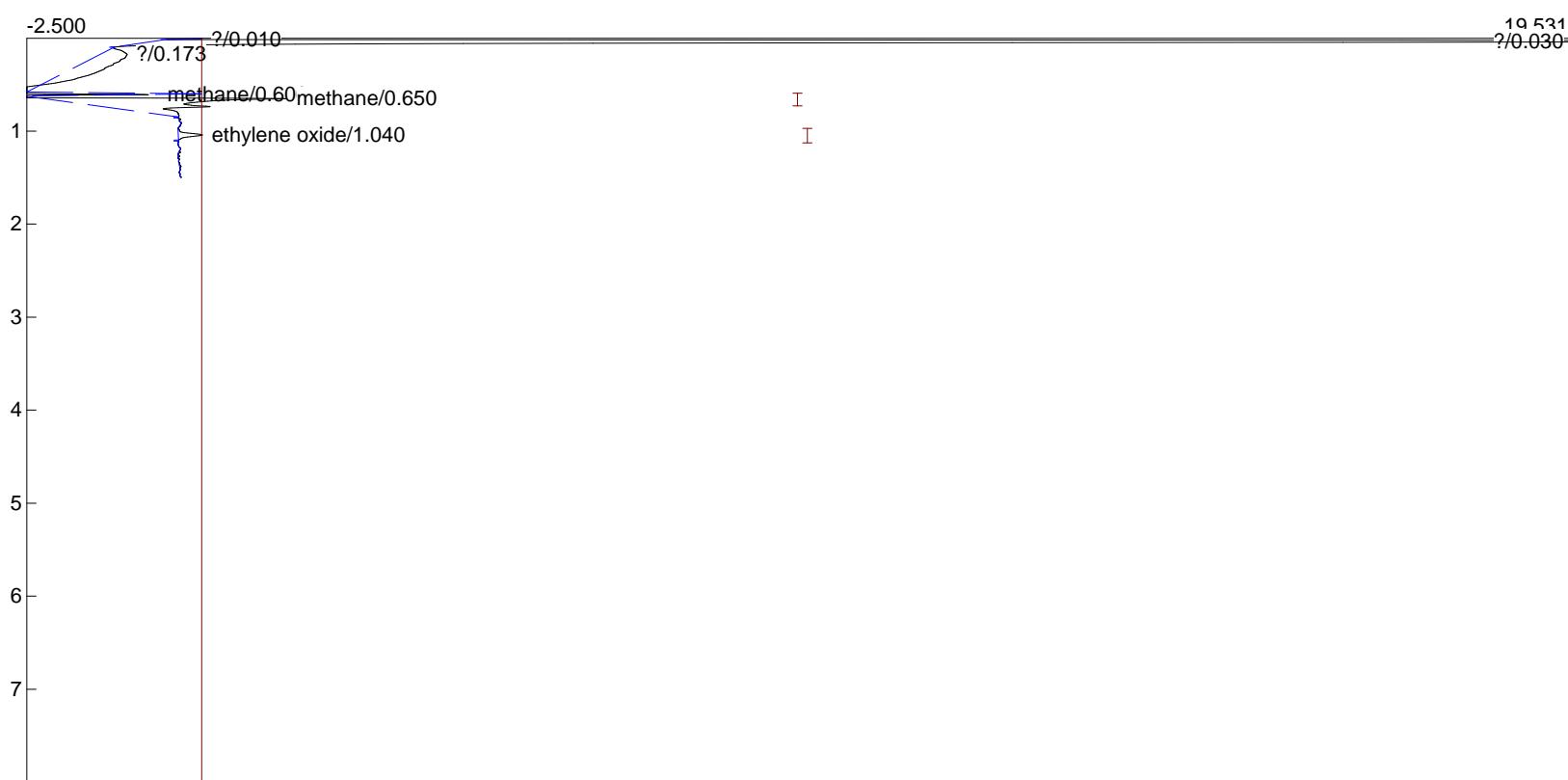
Component	Retention	Area	Height	External	Units
methane	0.610	4.5686	4.452	1.5123	
methane	0.653	85.2972	14.442	28.2358	
ethylene oxide	1.043	0.9329	0.392	0.3236	
			90.7987	30.0717	



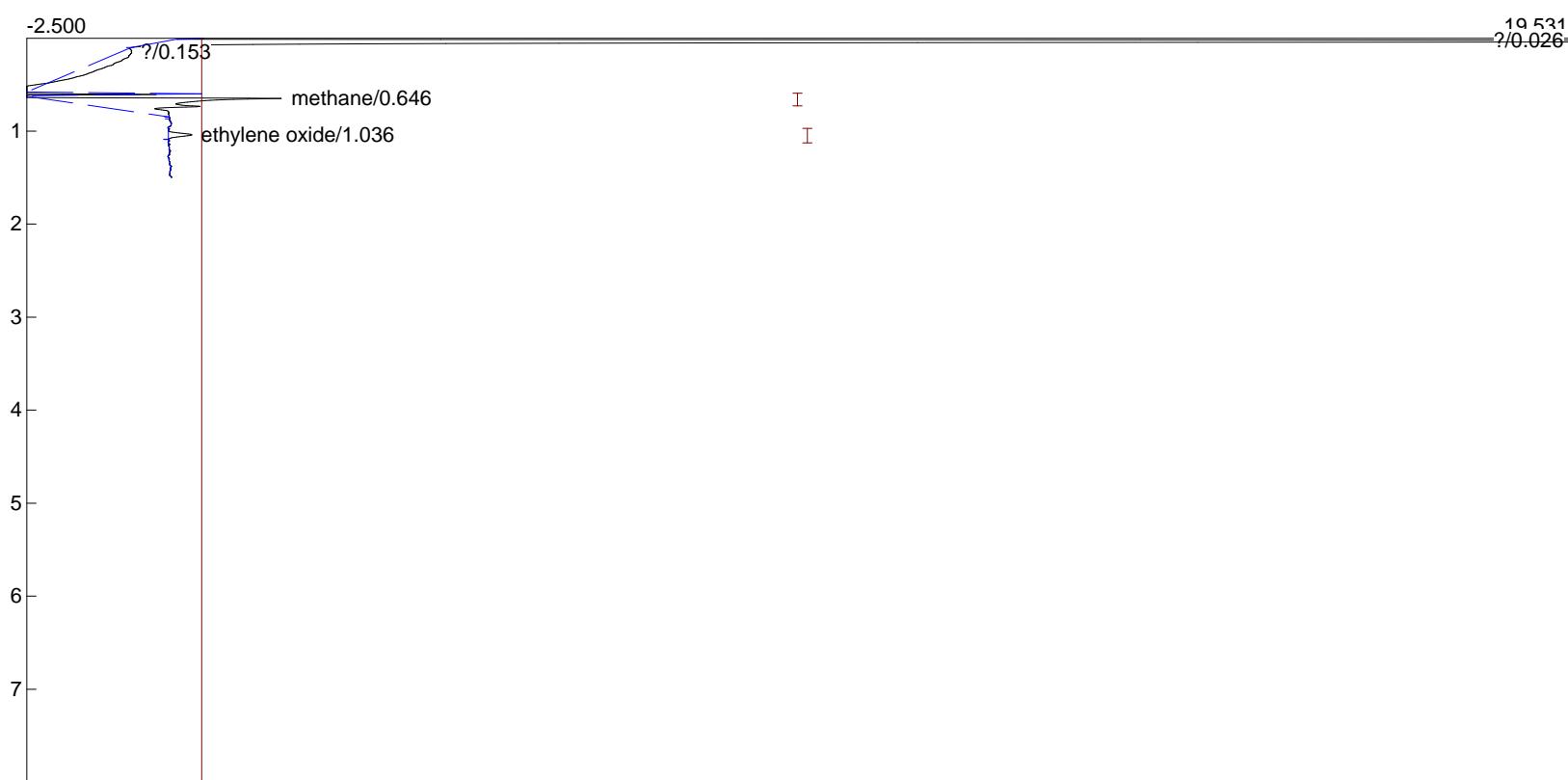
Component	Retention	Area	Height	External	Units
methane	0.653	83.7114	14.369	27.7109	
ethylene oxide	1.043	0.8636	0.375	0.2995	
		84.5750		28.0104	



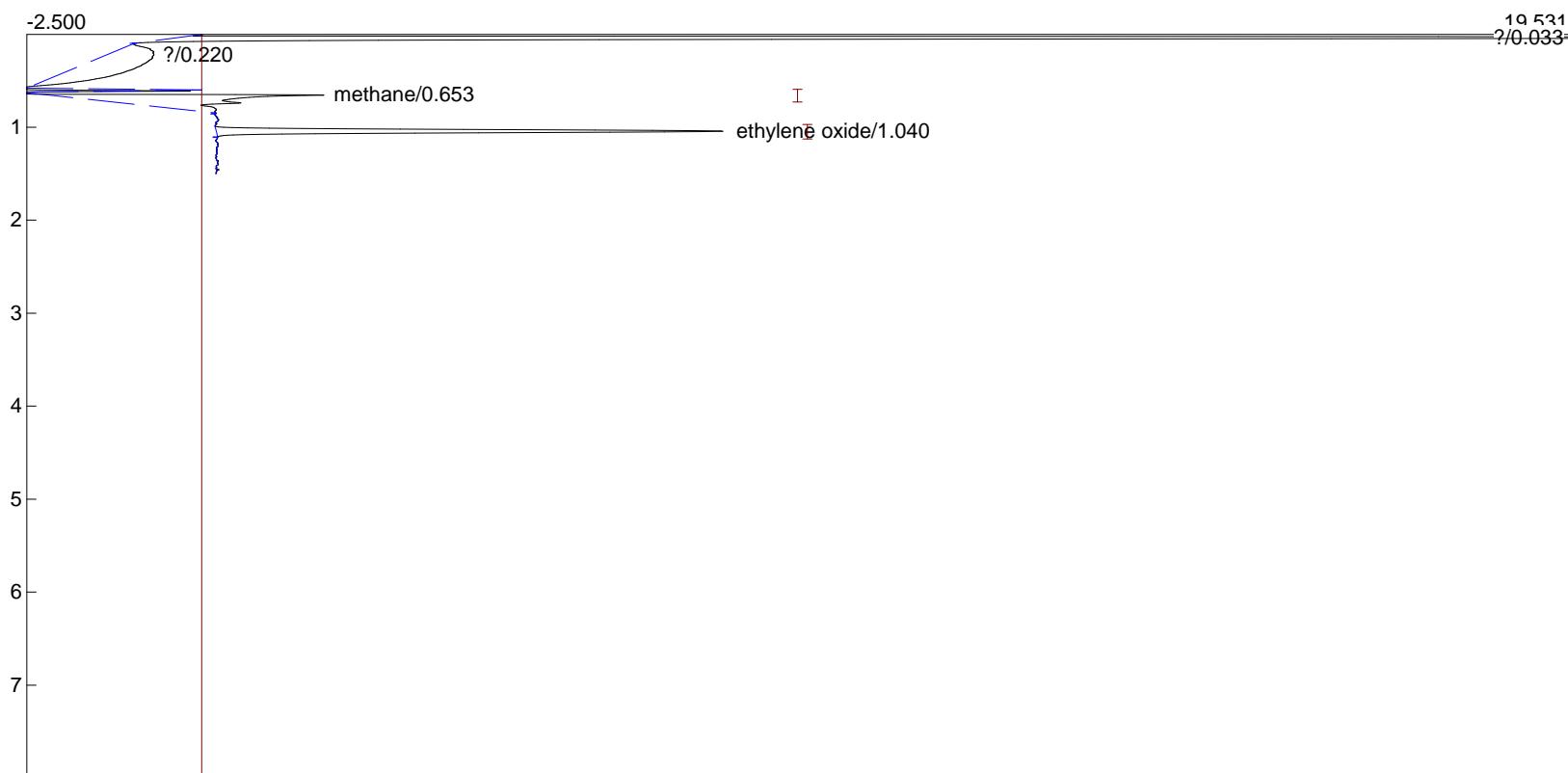
Component	Retention	Area	Height	External	Units
methane	0.606	3.6937	3.396	1.2227	
methane	0.646	88.7630	14.612	29.3831	
ethylene oxide	1.040	0.8498	0.346	0.2947	
			93.3065	30.9006	



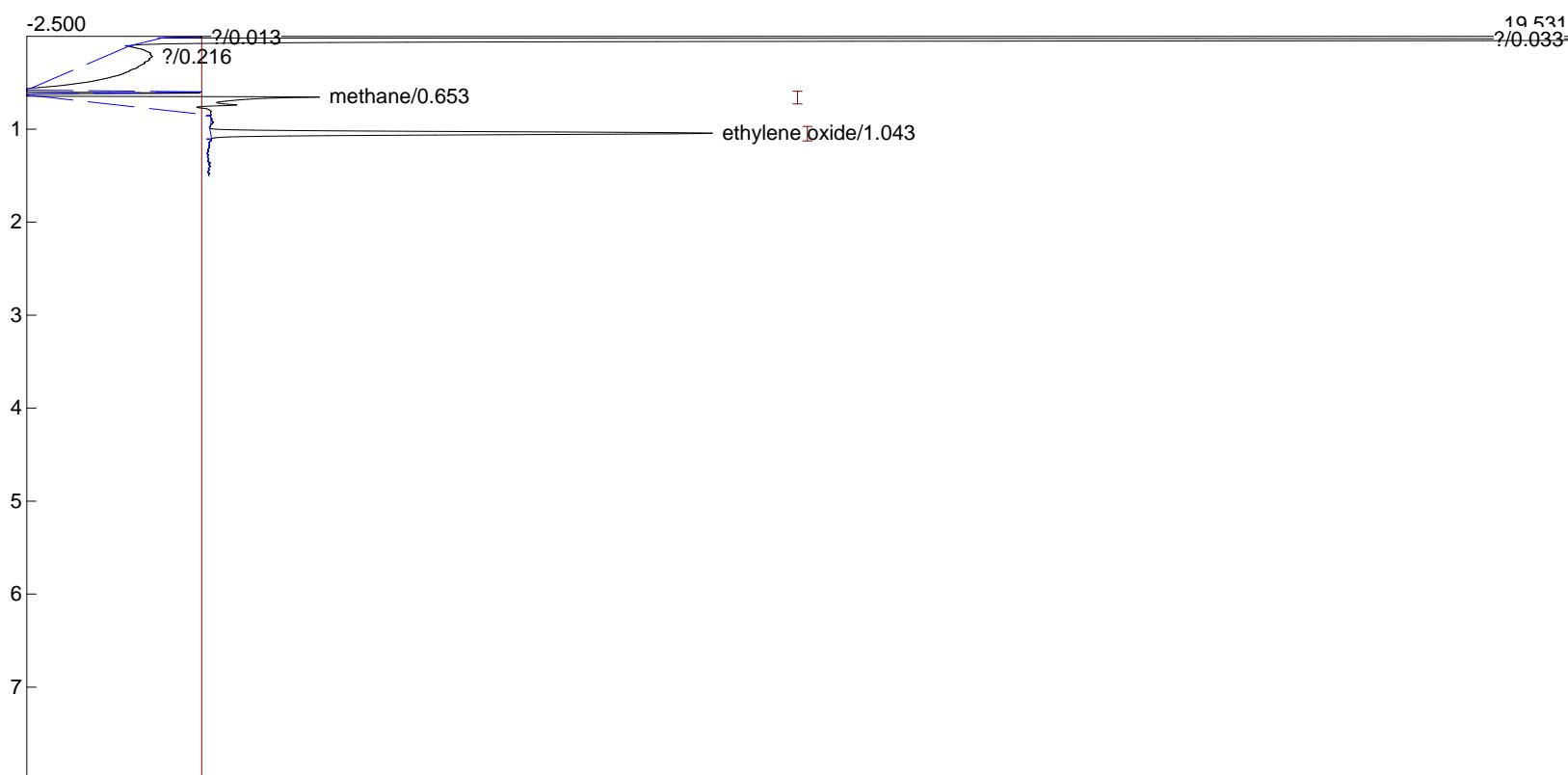
Component	Retention	Area	Height	External	Units
methane	0.606	3.6748	3.265	1.2165	
methane	0.650	86.3966	14.220	28.5997	
ethylene oxide	1.040	0.8406	0.347	0.2916	
			90.9120	30.1078	



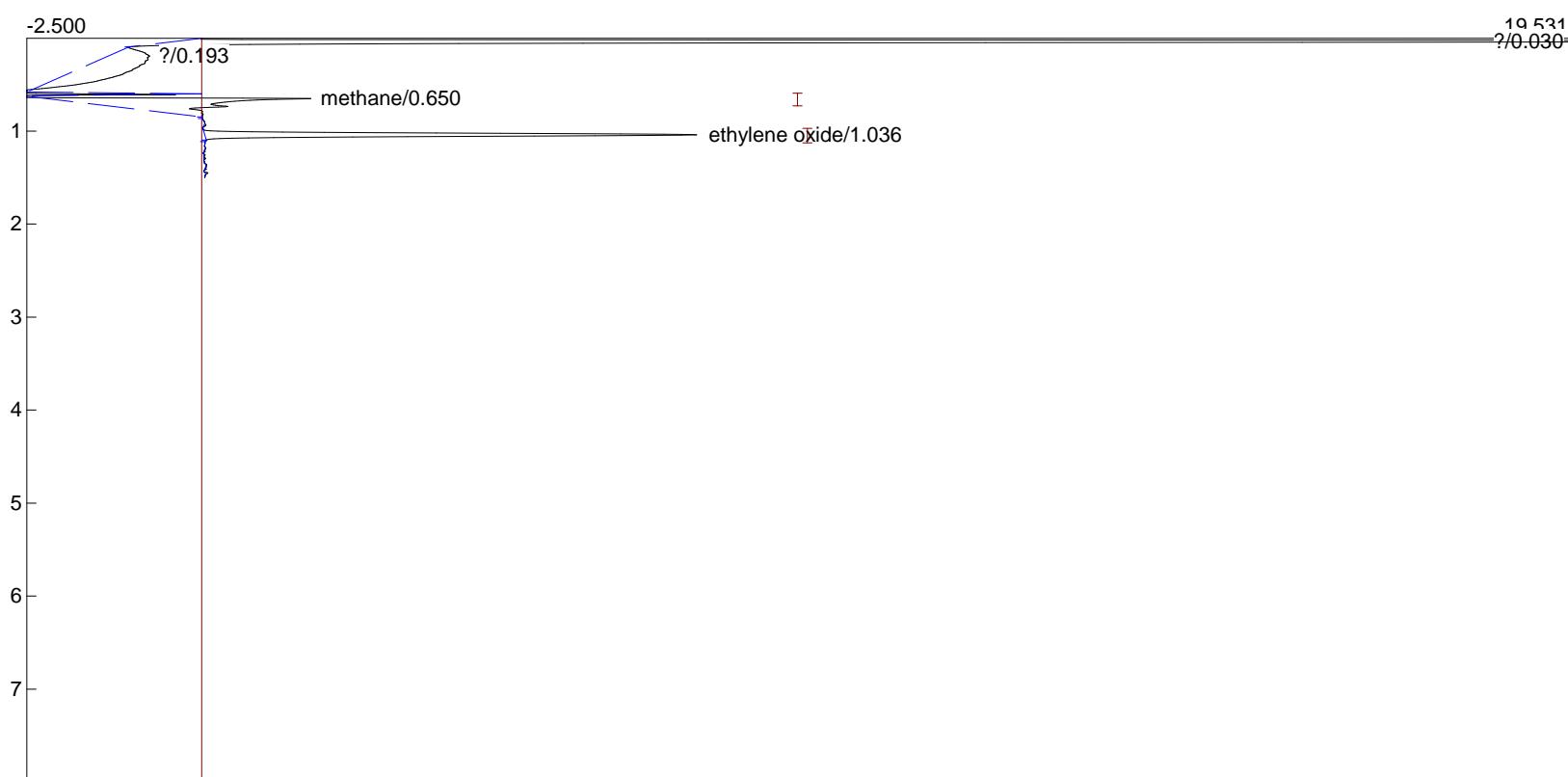
Component	Retention	Area	Height	External	Units
methane	0.646	86.7192	14.364	28.7065	
ethylene oxide	1.036	0.7860	0.335	0.2726	
		87.5052		28.9791	



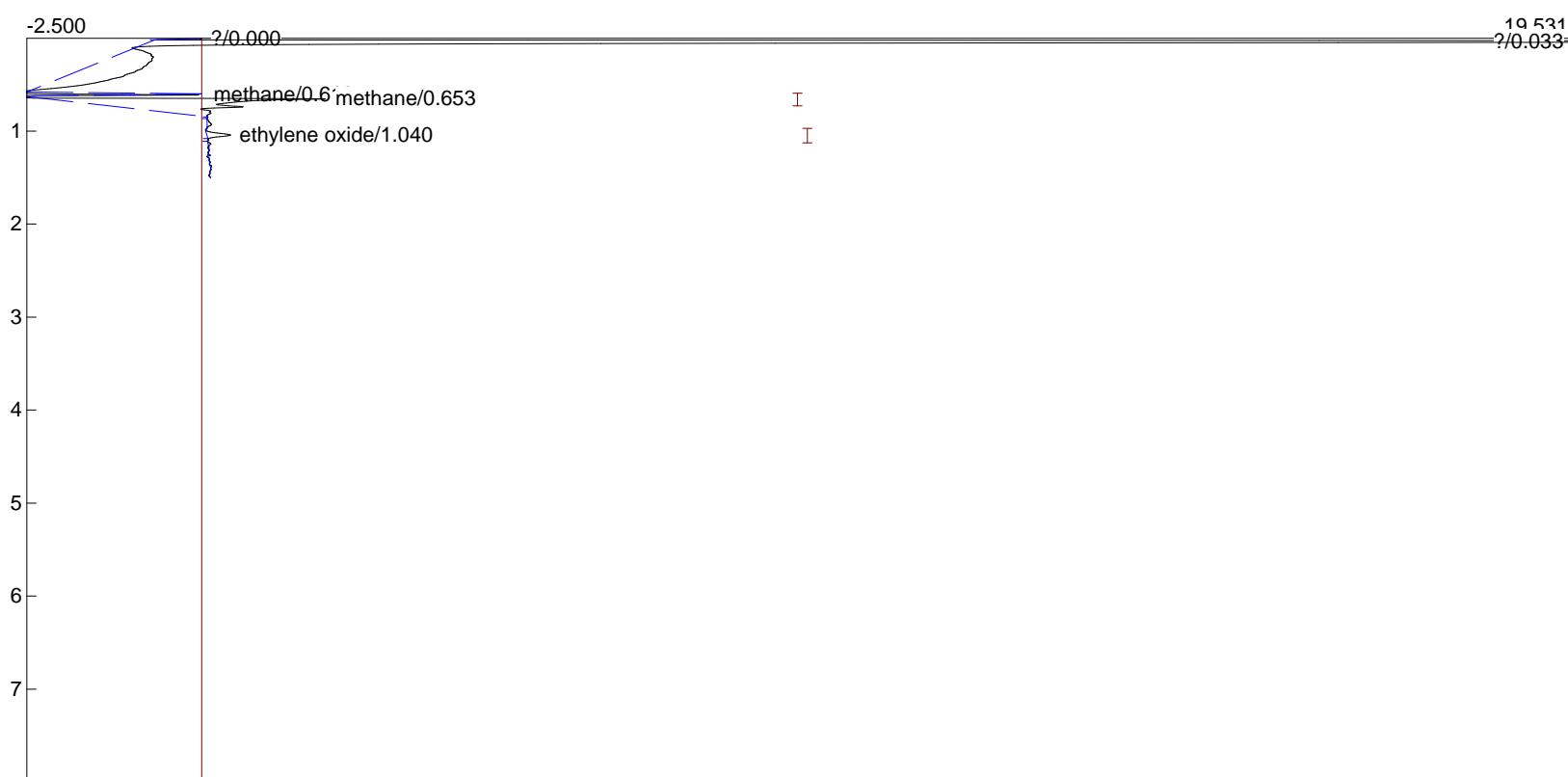
Component	Retention	Area	Height	External	Units
methane	0.653	83.3110	13.967	27.5783	
ethylene oxide	1.040	16.8229	7.303	5.8349	
		100.1339		33.4132	



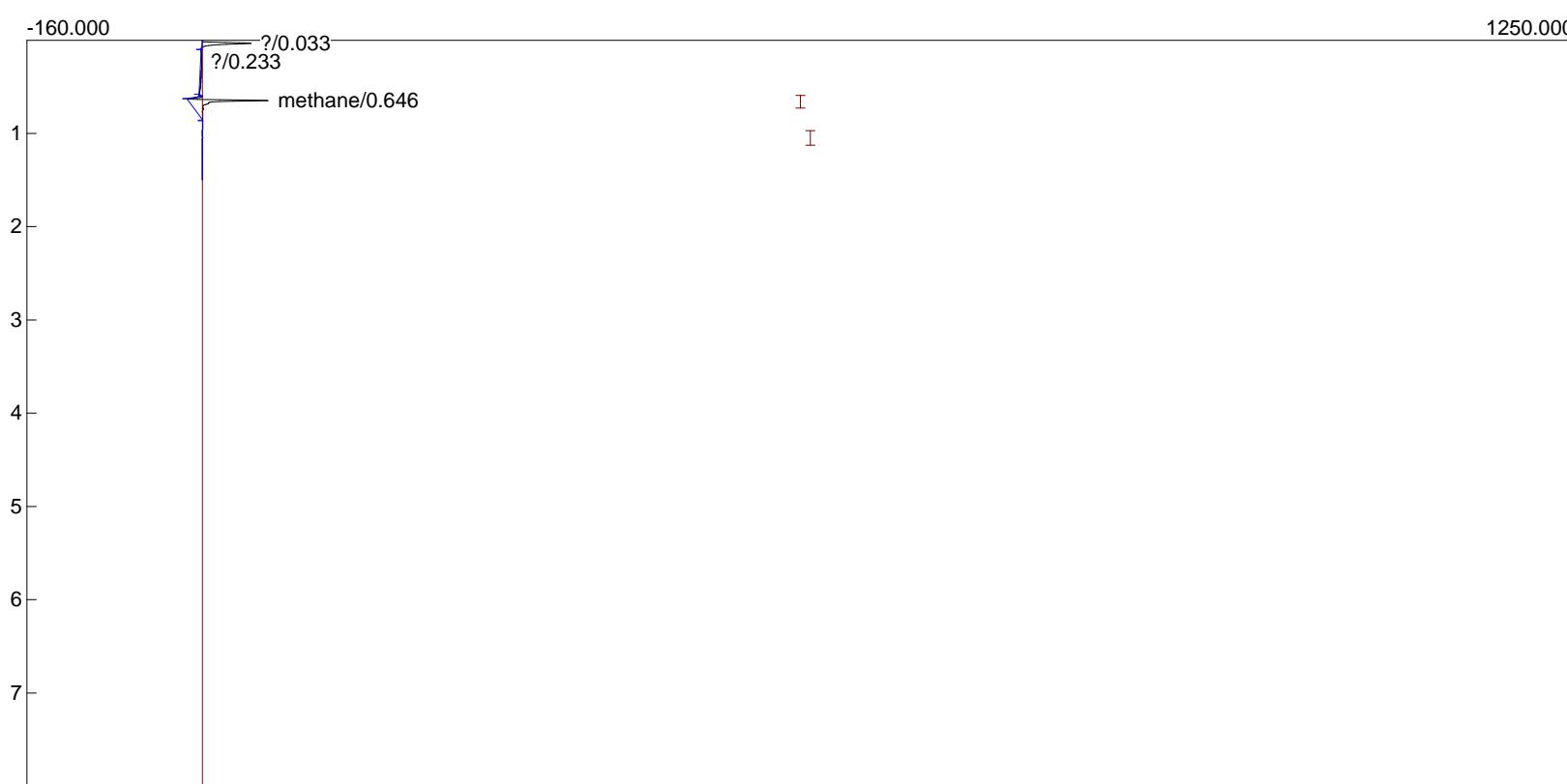
Component	Retention	Area	Height	External	Units
methane	0.653	84.1087	14.096	27.8424	
ethylene oxide	1.043	16.6146	7.180	5.7627	
		100.7233		33.6050	



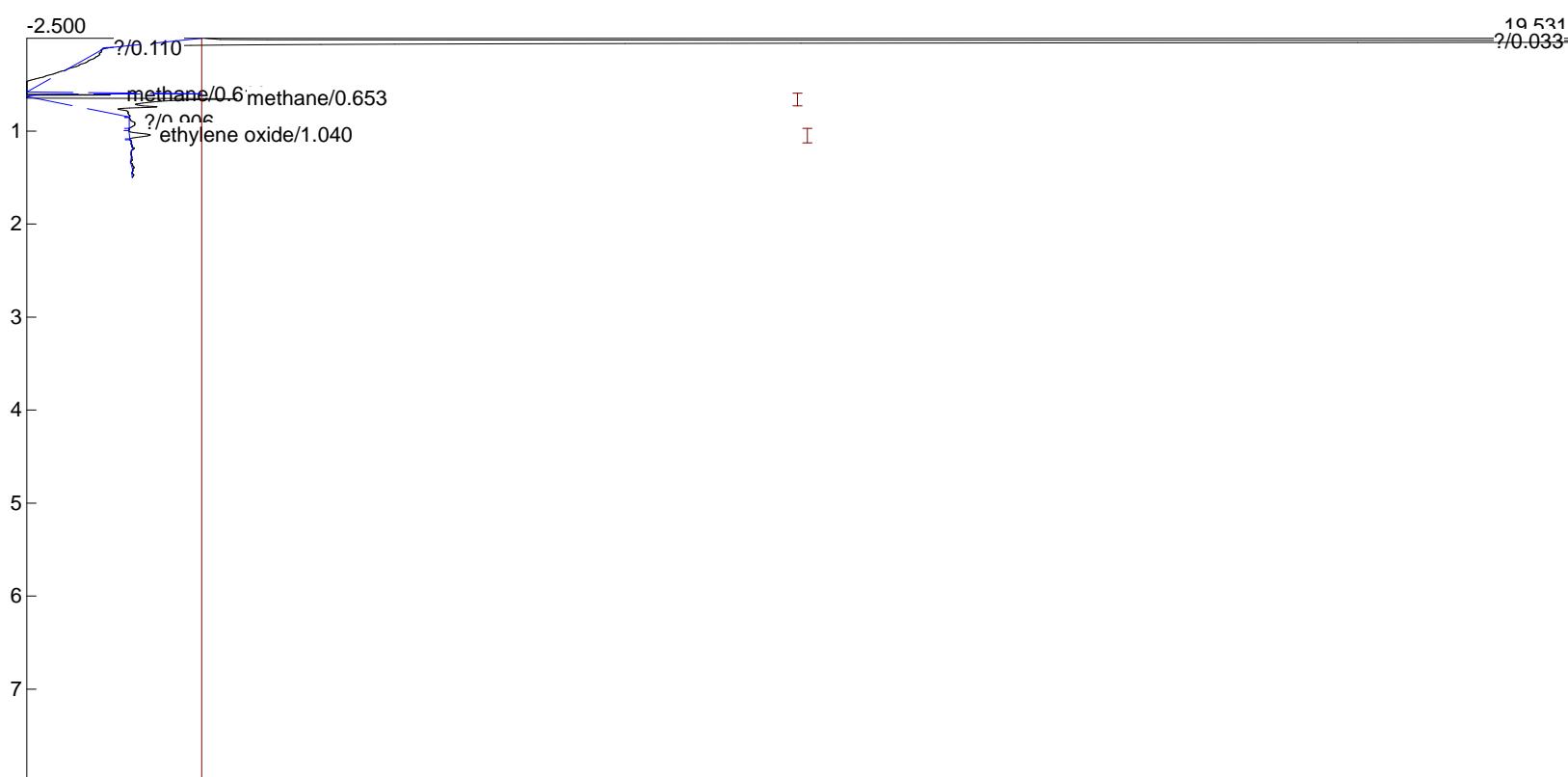
Component	Retention	Area	Height	External	Units
methane	0.650	84.9552	13.924	28.1226	
ethylene oxide	1.036	16.3112	7.070	5.6574	
		101.2664		33.7800	



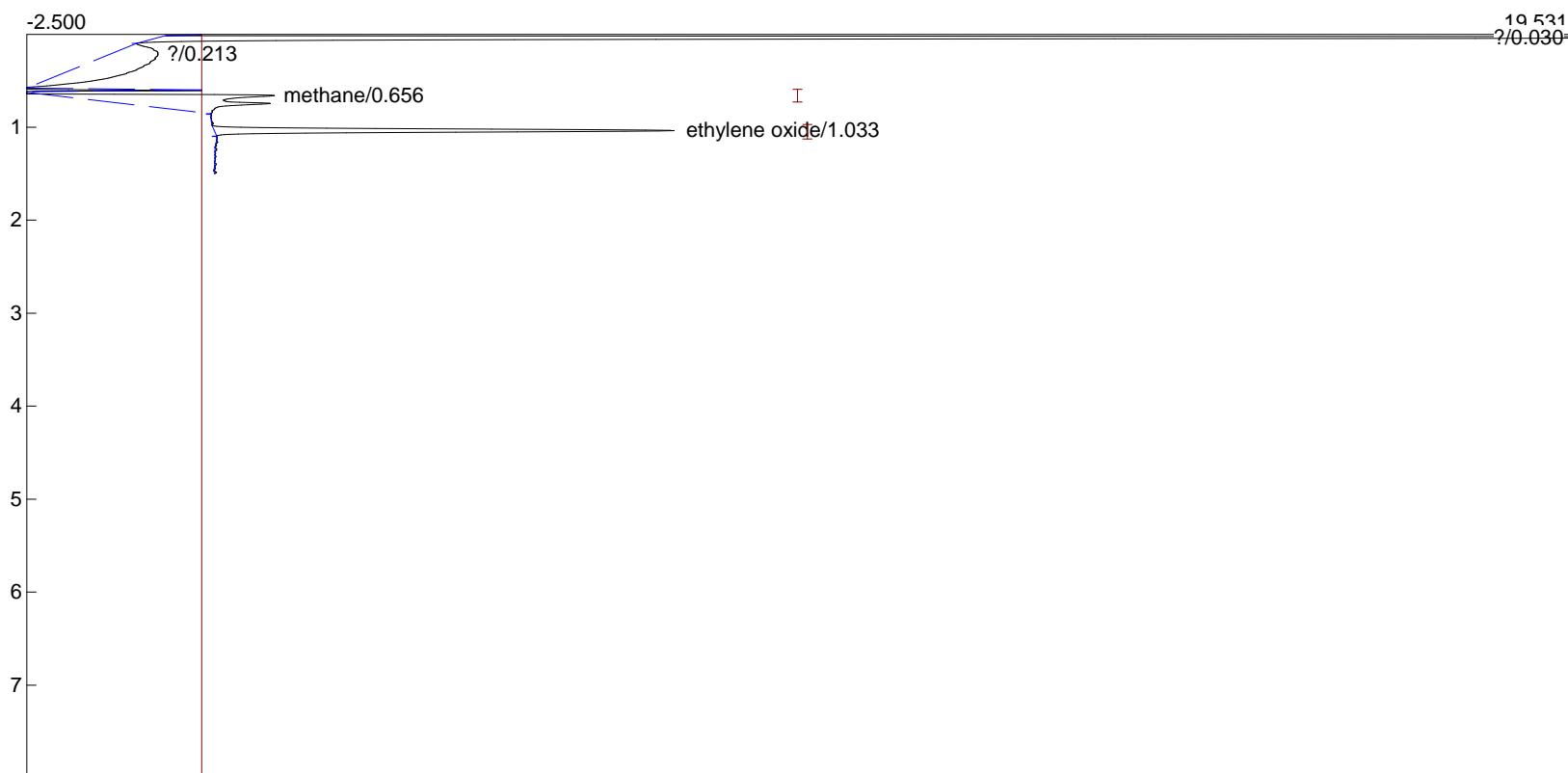
Component	Retention	Area	Height	External	Units
methane	0.610	5.1180	4.680	1.6942	
methane	0.653	81.9495	13.774	27.1276	
ethylene oxide	1.040	0.8284	0.339	0.2873	
		87.8959			29.1092



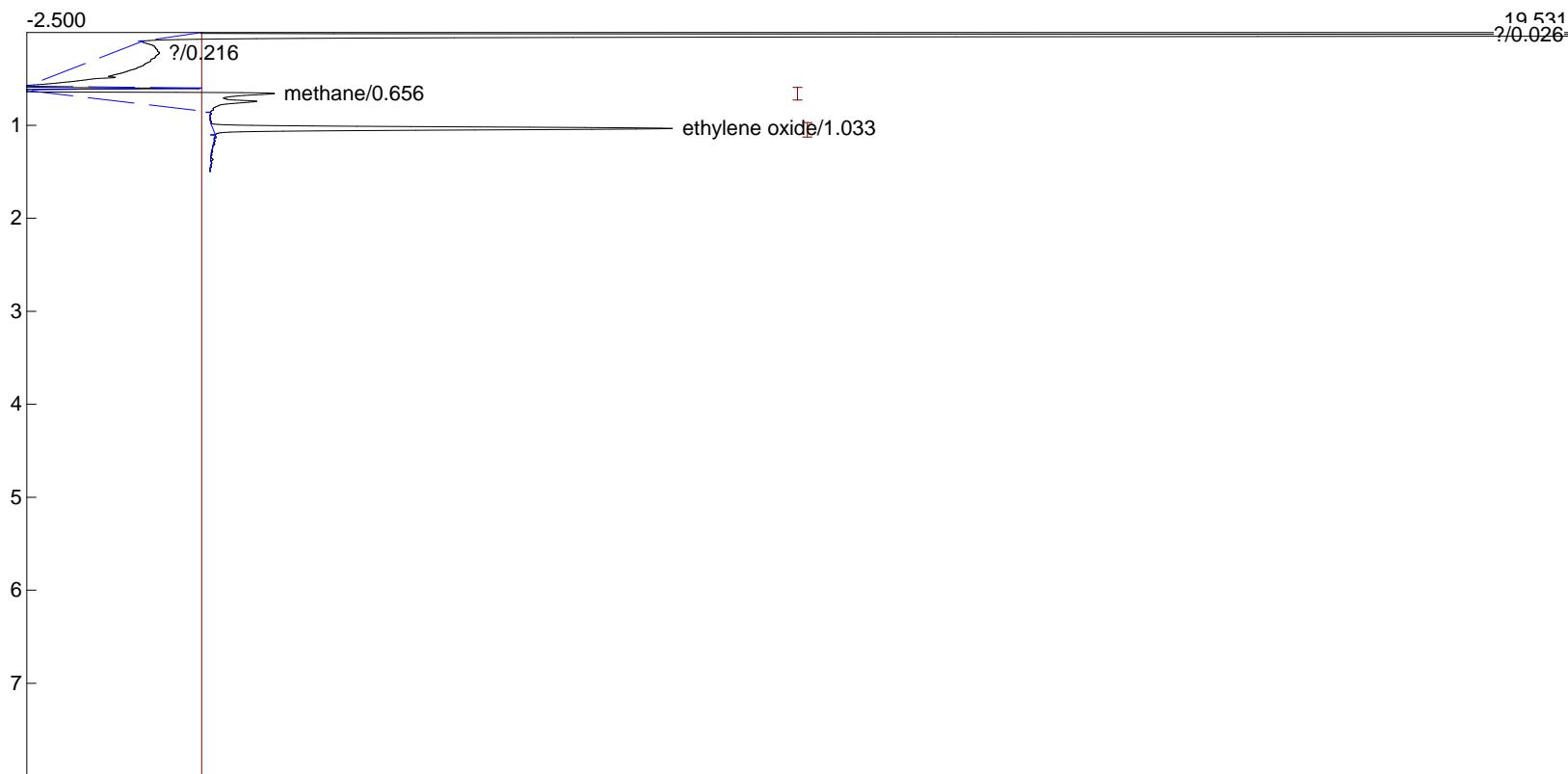
Component	Retention	Area	Height	External	Units
methane	0.646	157.0710	73.509	51.9950	
		157.0710		51.9950	



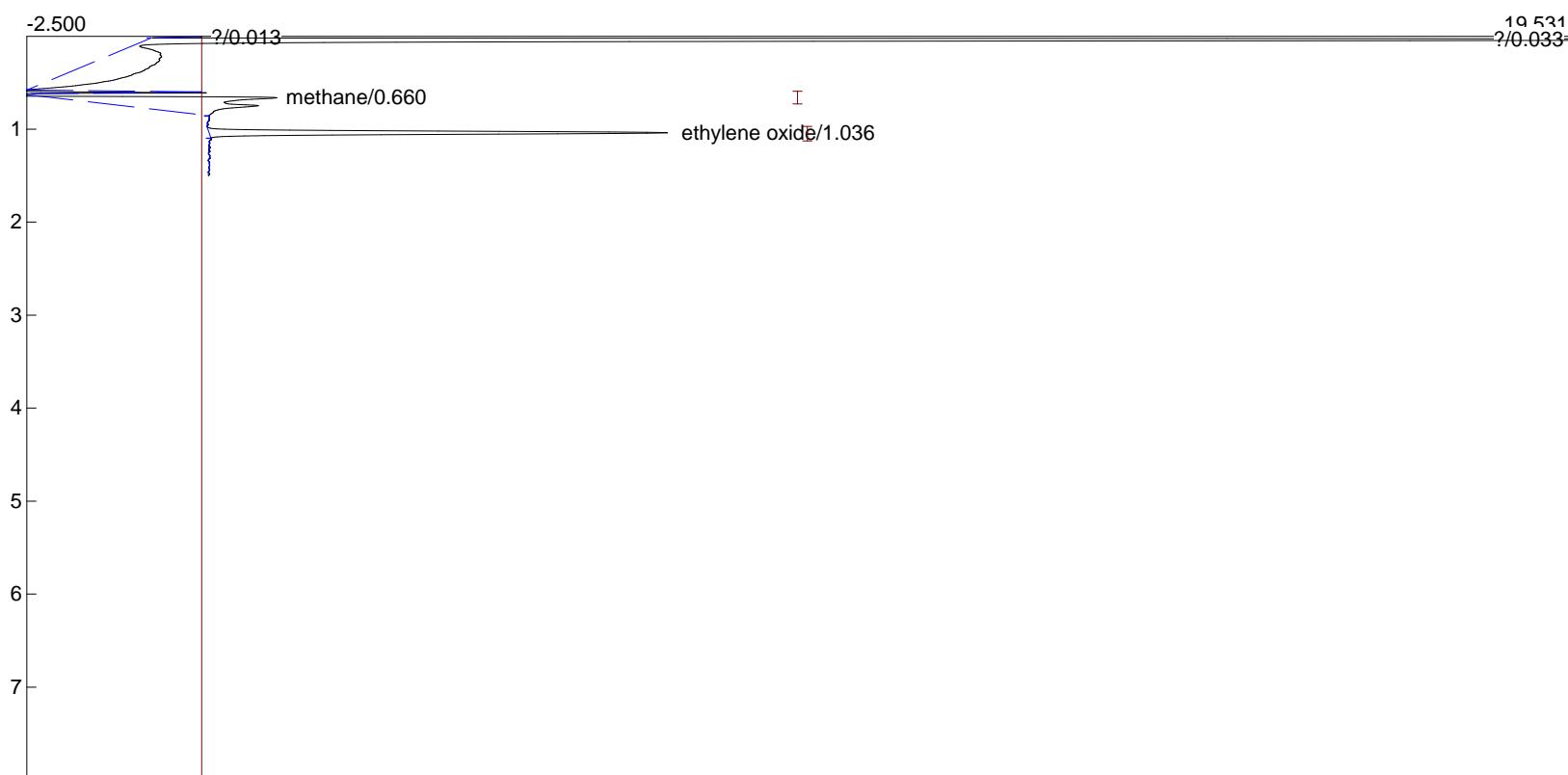
Component	Retention	Area	Height	External	Units
methane	0.610	4.8209	4.326	1.5959	
methane	0.653	81.3796	13.618	26.9390	
ethylene oxide	1.040	0.7272	0.301	0.2522	
		86.9277			28.7870



Component	Retention	Area	Height	External	Units
methane	0.656	80.0338	11.847	26.4935	
ethylene oxide	1.033	15.1908	6.612	5.2688	
		95.2246		31.7623	



Component	Retention	Area	Height	External	Units
methane	0.656	80.8129	11.646	26.7514	
ethylene oxide	1.033	15.1826	6.578	5.2660	
		95.9955		32.0174	



Component	Retention	Area	Height	External	Units
methane	0.660	78.3241	11.761	25.9275	
ethylene oxide	1.036	15.1634	6.619	5.2593	
		93.4875		31.1868	

Secondary Aeration Test

Non-Isokinetic Source Sampling Data Sheet

Project		Source		Date	Operators
Id	Client	Facility	Id		
Cu. Lien	North Haven	UTSLR	Secondary	30.09	MH 23

Run	Time	Initial Leak Check		Final Leak Check	
		in Hg	cfm	in Hg	cfm
1	915 - 1015	5	0.000		
Elapsed Time (min)	DGM Volume (liters)	Ball Flow Meter Setting	Temperature (°F)	Vacuum (in Hg)	
0	0.000	.15	141	85	
10	1.2		85	85	
20	2.4		90	90	
30	3.7		93	93	
40	4.8		101	101	
50	5.8		109	109	
60	6.973				
	Initial Weight (g)	Final Weight (g)			

Run	Time	Initial Leak Check		Final Leak Check	
		in Hg	cfm	in Hg	cfm
3	1119 - 1219	5	0.000		
Elapsed Time (min)	DGM Volume (liters)	Ball Flow Meter Setting	Temperature (°F)	Vacuum (in Hg)	
0	0.000	.15	141	122	
10	1.3		122	122	
20	2.5		123	123	
30	3.6		123	123	
40	4.8		123	123	
50	5.8		123	123	
60	7.025				
	Initial Weight (g)	Final Weight (g)			

Appendix C

Run	Time	Initial Leak Check		Final Leak Check	
		in Hg	cfm	in Hg	cfm
2	1217 - 1117	5	0.000		
Elapsed Time (min)	DGM Volume (liters)	Ball Flow Meter Setting	Temperature (°F)	Vacuum (in Hg)	
0	0.000	.15	NA	113	113
10	1.2		115	115	
20	2.4		117	117	
30	3.7		118	118	
40	4.9		119	119	
50	5.9		121	121	
60	7.089				
	Initial Weight (g)	Final Weight (g)			

Run	Time	Initial Leak Check		Final Leak Check	
		in Hg	cfm	in Hg	cfm
Elapsed Time (min)	DGM Volume (liters)	Ball Flow Meter Setting	Temperature (°F)	Vacuum (in Hg)	
0	0.000	.15	NA	0	
10	1.3		10		
20	2.5		20		
30	3.6		30		
40	4.8		40		
50	5.8		50		
60	60				
	Initial Weight (g)	Final Weight (g)			

000
000
000

Secondary Aeration

Project			Source		Pitot Tube			Date	Operators
Id	Client	Facility	Id	Location	Leak Check	Id	Cp		
	Covidien	North Haven	Sterilizer	Sawley	+ ✓ - ✓	4-1	0.84	8/16/16	EB : MM

Notes:

16
7/11/16

APPENDIX D

EPA METHODS 3A AND 25A EMISSIONS TEST DATA

<u>Run</u>	<u>Start</u>	<u>Stop</u>	O2 (%) <u>Inlet</u>	CO2 (%) <u>Inlet</u>	THC (ppmw) <u>Inlet</u>	O2 (%) <u>Outlet</u>	CO2 (%) <u>Outlet</u>	THC (ppmw) <u>Outlet</u>
Pre	09Aug2016 - 15:02:00	10Aug2016 - 07:26:55	20.85	-0.05	41.98	20.66	-0.05	36.76
Pre 2	10Aug2016 - 07:52:00	10Aug2016 - 14:32:36	20.78	-0.03	24.63	20.63	-0.02	55.13
1	10Aug2016 - 15:22:00	10Aug2016 - 16:22:00	20.74	0	398.31	20.54	0.01	23.07
2	10Aug2016 - 16:54:00	10Aug2016 - 17:54:00	20.82	0	586.07	20.61	0	62.28
3	10Aug2016 - 18:50:00	10Aug2016 - 19:50:00	20.77	0	502.73	20.62	-0.02	52.9

<u>Cylinder Gas</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
Zero ID						
Zero Expiration						
Low ID			CC14721			CC477465
Low Expiration			7/28/2023			1/22/2024
Low Concentration			1504			8.32
Mid ID	CC156934	CC156934	CC111599	CC156934	CC156934	CC477487
Mid Expiration	5/2/2024	5/2/2024	7/28/2023	4/26/2019	5/2/2024	1/22/2024
Mid Concentration	9.98	9.87	2494	9.98	9.87	14.74
High ID	CC147738	CC147738	CC201611	CC147738	CC147738	CC103877
High Expiration	12/17/2023	12/17/2023	8/4/2023	5/3/2019	12/17/2023	2/9/2023
High Concentration	22.02	17.63	4474	22.02	17.63	24.7
<u>Calibration Error</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
09Aug2016 - 14:57:22	0.23	0.16	1.78	0.22	0.07	0.06
Zero Response	1.05	0.91	0.04	0.99	0.39	0.22
Zero Error (%)	0	0	1520.29	0	0	8.37
Low Response	0	0	1.08	0	0	0.6
Low Error (%)	10.18	9.85	2528.6	10.21	9.95	14.51
Mid Response	0.93	-0.11	1.39	1.03	0.46	-1.54
High Response	21.99	17.58	4499.89	22.03	17.61	24.63
High Error (%)	-0.15	-0.26	0.58	0.05	-0.1	-0.27
<u>Initial Bias</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
09Aug2016 - 15:00:18	0.3	0.15	1.78	0.31	0.07	0.06
Zero Response	0.3	-0.05	0	0.4	0.01	0
Zero Bias (%)	9.98	9.87	1504	9.98	9.87	8.32
Span Concentration	10.13	9.78	1520.29	10.18	9.95	8.37
Span Response	-0.25	-0.42	0	-0.13	0.01	0
<u>Final Bias & Drift</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 07:36:27	0.24	0.16	1.8	0.24	0.06	-0.13
Zero Response	0.06	-0.02	0	0.12	-0.03	-0.74
Zero Bias (%)	-0.24	0.03	0	-0.28	-0.04	-0.74
Zero Drift (%)	9.98	9.87	1504	9.98	9.87	8.32
Span Concentration	10.17	9.81	1507.02	10.17	9.9	8.61
Span Response	-0.08	-0.22	-0.3	-0.16	-0.26	0.96
Span Bias (%)	0.17	0.2	-0.3	-0.03	-0.27	0.96
<u>Results</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
Corrected Averages	20.85	-0.05	41.98	20.66	-0.05	36.76

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
09Aug2016 - 15:03:00	20.87	0.11	-0.83	20.77	0.02	34.13
09Aug2016 - 15:04:00	20.88	0.11	0.12	20.78	0.02	34.14
09Aug2016 - 15:05:00	20.89	0.11	0.11	20.79	0.02	34.27
09Aug2016 - 15:06:00	20.88	0.11	-0.21	20.79	0.02	33.58
09Aug2016 - 15:07:00	20.89	0.11	-0.11	20.79	0.02	33.2
09Aug2016 - 15:08:00	20.89	0.1	0.05	20.79	0.02	33.47
09Aug2016 - 15:09:00	20.89	0.11	-0.06	20.79	0.02	33.34
09Aug2016 - 15:10:00	20.88	0.1	0.08	20.78	0.02	33.35
09Aug2016 - 15:11:00	20.88	0.1	-0.14	20.78	0.02	33.74
09Aug2016 - 15:12:00	20.87	0.1	-0.01	20.78	0.02	35.09
09Aug2016 - 15:13:00	20.86	0.11	0.27	20.76	0.02	34.71
09Aug2016 - 15:14:00	20.87	0.1	-0.08	20.77	0.02	32.9
09Aug2016 - 15:15:00	20.88	0.1	-0.23	20.78	0.02	32.08
09Aug2016 - 15:16:00	20.88	0.1	0.61	20.78	0.02	33.08
09Aug2016 - 15:17:00	20.87	0.1	0.63	20.78	0.02	34.07
09Aug2016 - 15:18:00	20.88	0.1	0.66	20.78	0.02	33.52
09Aug2016 - 15:19:00	20.88	0.1	0.86	20.78	0.02	32.83
09Aug2016 - 15:20:00	20.88	0.11	0.32	20.79	0.02	34.2
09Aug2016 - 15:21:00	20.88	0.11	0.45	20.78	0.02	33.16
09Aug2016 - 15:22:00	20.88	0.11	0.17	20.78	0.02	33.1
09Aug2016 - 15:23:00	20.89	0.1	0.38	20.78	0.02	32.22
09Aug2016 - 15:24:00	20.89	0.1	0.42	20.79	0.02	31.99
09Aug2016 - 15:25:00	20.89	0.1	0.51	20.79	0.02	31.8
09Aug2016 - 15:26:00	20.89	0.11	0.21	20.78	0.03	32.35
09Aug2016 - 15:27:00	20.89	0.11	0.35	20.78	0.03	31.82
09Aug2016 - 15:28:00	20.89	0.1	0.47	20.78	0.02	32.06
09Aug2016 - 15:29:00	20.89	0.1	0.04	20.78	0.02	31.87
09Aug2016 - 15:30:00	20.88	0.1	0.15	20.79	0.02	31.5
09Aug2016 - 15:31:00	20.89	0.1	0.45	20.78	0.02	32.21
09Aug2016 - 15:32:00	20.88	0.1	0.65	20.79	0.02	32.54
09Aug2016 - 15:33:00	20.89	0.1	-0.1	20.79	0.02	31.99
09Aug2016 - 15:34:00	20.88	0.1	0.45	20.78	0.02	32.42
09Aug2016 - 15:35:00	20.88	0.1	0.44	20.78	0.02	32.94
09Aug2016 - 15:36:00	20.88	0.1	0.29	20.79	0.02	32.75
09Aug2016 - 15:37:00	20.88	0.1	-0.4	20.79	0.02	32.69
09Aug2016 - 15:38:00	20.88	0.1	-0.16	20.79	0.02	32.05
09Aug2016 - 15:39:00	20.89	0.1	0.01	20.79	0.02	31.93
09Aug2016 - 15:40:00	20.89	0.1	-0.51	20.79	0.02	32.92
09Aug2016 - 15:41:00	20.89	0.1	0.53	20.79	0.02	32.9
09Aug2016 - 15:42:00	20.89	0.1	-0.73	20.79	0.02	32.75
09Aug2016 - 15:43:00	20.89	0.1	-1.16	20.79	0.02	31.24
09Aug2016 - 15:44:00	20.89	0.1	-1.42	20.8	0.02	31.16
09Aug2016 - 15:45:00	20.89	0.1	-1.31	20.8	0.02	31.21
09Aug2016 - 15:46:00	20.89	0.1	-1.38	20.81	0.02	31.89
09Aug2016 - 15:47:00	20.89	0.1	-1.51	20.81	0.02	32.87
09Aug2016 - 15:48:00	20.89	0.1	-1.03	20.8	0.02	32.35
09Aug2016 - 15:49:00	20.89	0.1	-0.9	20.8	0.02	32.57
09Aug2016 - 15:50:00	20.89	0.1	-0.85	20.8	0.02	33.04
09Aug2016 - 15:51:00	20.88	0.1	-1.15	20.8	0.02	32.62
09Aug2016 - 15:52:00	20.89	0.1	-1.22	20.8	0.02	32.26
09Aug2016 - 15:53:00	20.88	0.1	-1.58	20.79	0.02	32.06
09Aug2016 - 15:54:00	20.88	0.1	-1.72	20.79	0.02	31.62
09Aug2016 - 15:55:00	20.88	0.1	-1.46	20.79	0.02	31.81
09Aug2016 - 15:56:00	20.88	0.1	-1.38	20.8	0.02	31.82
09Aug2016 - 15:57:00	20.89	0.1	-1.37	20.79	0.02	32.22
09Aug2016 - 15:58:00	20.88	0.1	-1.48	20.79	0.02	32.97
09Aug2016 - 15:59:00	20.88	0.1	-1.39	20.79	0.02	32.51
09Aug2016 - 16:00:00	20.88	0.1	-1.26	20.79	0.02	32.7
09Aug2016 - 16:01:00	20.89	0.1	-1.86	20.8	0.02	31.57
09Aug2016 - 16:02:00	20.89	0.1	-1.83	20.8	0.02	30.77
09Aug2016 - 16:03:00	20.89	0.1	-1.97	20.79	0.02	31.4
09Aug2016 - 16:04:00	20.89	0.1	-1.75	20.79	0.02	31.34
09Aug2016 - 16:05:00	20.89	0.1	-1.85	20.79	0.02	32.42
09Aug2016 - 16:06:00	20.89	0.1	-1.33	20.79	0.02	32.42
09Aug2016 - 16:07:00	20.89	0.1	-1.38	20.79	0.02	32.21
09Aug2016 - 16:08:00	20.89	0.1	-1.67	20.79	0.02	32.75
09Aug2016 - 16:09:00	20.9	0.1	-1.2	20.79	0.02	32.9
09Aug2016 - 16:10:00	20.9	0.1	-1.1	20.79	0.02	32.49
09Aug2016 - 16:11:00	20.89	0.1	-1.39	20.79	0.02	32.29
09Aug2016 - 16:12:00	20.89	0.1	-1.07	20.79	0.02	32.14
09Aug2016 - 16:13:00	20.89	0.1	-1.66	20.79	0.02	31.36
09Aug2016 - 16:14:00	20.9	0.1	-1.69	20.79	0.02	31.99
09Aug2016 - 16:15:00	20.9	0.1	-1.91	20.79	0.02	32.72
09Aug2016 - 16:16:00	20.89	0.1	-1.5	20.79	0.02	32.73
09Aug2016 - 16:17:00	20.9	0.1	-2.01	20.79	0.02	32.57
09Aug2016 - 16:18:00	20.89	0.1	-1.88	20.79	0.02	32.82
09Aug2016 - 16:19:00	20.89	0.1	-2.08	20.8	0.02	32.45
09Aug2016 - 16:20:00	20.9	0.1	-2.18	20.8	0.02	32.8
09Aug2016 - 16:21:00	20.9	0.1	-1.84	20.79	0.02	33.31
09Aug2016 - 16:22:00	20.9	0.1	-2.17	20.79	0.02	32.7
09Aug2016 - 16:23:00	20.9	0.1	-2.39	20.79	0.02	32.32
09Aug2016 - 16:24:00	20.9	0.1	-2.31	20.79	0.02	31.31
09Aug2016 - 16:25:00	20.9	0.1	-2.54	20.79	0.02	32.35
09Aug2016 - 16:26:00	20.9	0.1	-2.12	20.8	0.02	33.49
09Aug2016 - 16:27:00	20.9	0.1	-2.29	20.79	0.02	32.89
09Aug2016 - 16:28:00	20.9	0.1	-1.87	20.79	0.02	33.29
09Aug2016 - 16:29:00	20.9	0.1	-2.22	20.79	0.02	33.31

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
09Aug2016 - 16:30:00	20.9	0.1	-2.39	20.79	0.02	33.68
09Aug2016 - 16:31:00	20.9	0.1	-2.33	20.79	0.02	33.44
09Aug2016 - 16:32:00	20.9	0.1	-2.42	20.79	0.02	33.46
09Aug2016 - 16:33:00	20.9	0.1	-2.13	20.79	0.02	33.7
09Aug2016 - 16:34:00	20.89	0.1	-2.46	20.78	0.02	33.61
09Aug2016 - 16:35:00	20.89	0.1	-3.01	20.78	0.02	33.52
09Aug2016 - 16:36:00	20.89	0.1	-2.45	20.79	0.02	34.07
09Aug2016 - 16:37:00	20.89	0.1	-2.49	20.79	0.02	33.85
09Aug2016 - 16:38:00	20.89	0.1	-2.07	20.79	0.02	34.1
09Aug2016 - 16:39:00	20.89	0.1	-2.19	20.79	0.02	34.09
09Aug2016 - 16:40:00	20.89	0.1	-2.3	20.79	0.02	32.71
09Aug2016 - 16:41:00	20.88	0.1	-2.72	20.79	0.02	31.83
09Aug2016 - 16:42:00	20.88	0.1	-2.62	20.79	0.02	32.08
09Aug2016 - 16:43:00	20.88	0.1	-3.01	20.79	0.02	32.6
09Aug2016 - 16:44:00	20.89	0.1	-2.54	20.78	0.02	32.29
09Aug2016 - 16:45:00	20.89	0.1	-2.67	20.79	0.02	32.41
09Aug2016 - 16:46:00	20.89	0.1	-2.68	20.79	0.02	32.57
09Aug2016 - 16:47:00	20.89	0.1	-2.36	20.79	0.02	33.27
09Aug2016 - 16:48:00	20.88	0.1	-1.97	20.79	0.02	32.96
09Aug2016 - 16:49:00	20.89	0.1	-2.45	20.79	0.02	33.08
09Aug2016 - 16:50:00	20.89	0.1	-2.82	20.79	0.02	33.48
09Aug2016 - 16:51:00	20.89	0.1	-2.66	20.79	0.02	33.8
09Aug2016 - 16:52:00	20.89	0.1	-2.83	20.79	0.02	34.01
09Aug2016 - 16:53:00	20.89	0.1	-2.9	20.79	0.02	34.13
09Aug2016 - 16:54:00	20.89	0.1	-2.5	20.79	0.02	34.34
09Aug2016 - 16:55:00	20.89	0.1	-2.19	20.79	0.02	34.29
09Aug2016 - 16:56:00	20.89	0.1	-3.06	20.79	0.02	34.24
09Aug2016 - 16:57:00	20.89	0.1	-3	20.8	0.02	33.98
09Aug2016 - 16:58:00	20.89	0.1	-2.59	20.79	0.02	34.7
09Aug2016 - 16:59:00	20.89	0.1	-3.18	20.79	0.02	33.8
09Aug2016 - 17:00:00	20.89	0.1	-3.81	20.79	0.02	33.97
09Aug2016 - 17:01:00	20.89	0.1	-4.17	20.79	0.02	33.93
09Aug2016 - 17:02:00	20.89	0.1	-4.22	20.78	0.02	34.05
09Aug2016 - 17:03:00	20.89	0.1	-4.25	20.79	0.02	33.76
09Aug2016 - 17:04:00	20.89	0.1	-4.39	20.79	0.02	33.88
09Aug2016 - 17:05:00	20.89	0.1	-3.46	20.79	0.02	33.46
09Aug2016 - 17:06:00	20.89	0.1	-3.11	20.79	0.02	34.34
09Aug2016 - 17:07:00	20.88	0.1	-2.87	20.78	0.02	33.97
09Aug2016 - 17:08:00	20.89	0.1	-3.45	20.78	0.02	34.1
09Aug2016 - 17:09:00	20.88	0.1	-3.58	20.79	0.02	33.98
09Aug2016 - 17:10:00	20.89	0.1	-3.4	20.78	0.02	34.08
09Aug2016 - 17:11:00	20.88	0.1	-3.39	20.79	0.02	33.58
09Aug2016 - 17:12:00	20.89	0.1	-3.3	20.79	0.02	33.8
09Aug2016 - 17:13:00	20.89	0.1	-3.27	20.79	0.02	34.33
09Aug2016 - 17:14:00	20.88	0.1	-3.05	20.78	0.02	33.94
09Aug2016 - 17:15:00	20.89	0.1	-2.65	20.78	0.02	34.64
09Aug2016 - 17:16:00	20.89	0.1	-3.16	20.79	0.02	34.62
09Aug2016 - 17:17:00	20.89	0.1	-2.71	20.79	0.02	34.09
09Aug2016 - 17:18:00	20.88	0.1	-3.37	20.79	0.02	33.31
09Aug2016 - 17:19:00	20.89	0.1	-3.45	20.79	0.02	33.65
09Aug2016 - 17:20:00	20.89	0.1	-3.22	20.78	0.02	33.81
09Aug2016 - 17:21:00	20.89	0.1	-2.94	20.79	0.02	33.49
09Aug2016 - 17:22:00	20.89	0.1	-3.05	20.79	0.02	33.98
09Aug2016 - 17:23:00	20.89	0.1	-3.43	20.78	0.02	34.36
09Aug2016 - 17:24:00	20.88	0.1	-3.17	20.78	0.02	34.27
09Aug2016 - 17:25:00	20.88	0.1	-3	20.78	0.02	34.06
09Aug2016 - 17:26:00	20.89	0.1	-2.79	20.79	0.02	33.11
09Aug2016 - 17:27:00	20.88	0.1	-2.85	20.79	0.02	32.29
09Aug2016 - 17:28:00	20.88	0.1	-3.71	20.79	0.02	31.25
09Aug2016 - 17:29:00	20.88	0.1	-3.32	20.79	0.02	31.36
09Aug2016 - 17:30:00	20.88	0.1	-3.68	20.79	0.02	31.7
09Aug2016 - 17:31:00	20.88	0.1	-4.04	20.78	0.02	31.62
09Aug2016 - 17:32:00	20.89	0.1	-4.03	20.78	0.02	31.94
09Aug2016 - 17:33:00	20.88	0.1	-4	20.78	0.02	31.61
09Aug2016 - 17:34:00	20.88	0.1	-4.34	20.78	0.02	31.83
09Aug2016 - 17:35:00	20.88	0.1	-3.5	20.78	0.02	31.96
09Aug2016 - 17:36:00	20.88	0.1	-3.34	20.78	0.02	33.24
09Aug2016 - 17:37:00	20.88	0.1	-3.88	20.78	0.02	31.7
09Aug2016 - 17:38:00	20.89	0.1	-3.78	20.78	0.02	32.14
09Aug2016 - 17:39:00	20.88	0.1	-4.33	20.78	0.02	31.99
09Aug2016 - 17:40:00	20.88	0.1	-3.97	20.79	0.02	31.29
09Aug2016 - 17:41:00	20.88	0.1	-3.69	20.79	0.02	31.55
09Aug2016 - 17:42:00	20.88	0.1	-2.95	20.78	0.02	32.23
09Aug2016 - 17:43:00	20.88	0.1	-2.74	20.78	0.02	32.65
09Aug2016 - 17:44:00	20.88	0.1	-3.01	20.78	0.02	33.01
09Aug2016 - 17:45:00	20.88	0.1	-3.35	20.78	0.02	32.65
09Aug2016 - 17:46:00	20.89	0.1	-3.4	20.79	0.02	32.42
09Aug2016 - 17:47:00	20.89	0.1	-3.55	20.78	0.02	32.76
09Aug2016 - 17:48:00	20.89	0.1	-3.05	20.78	0.02	32.93
09Aug2016 - 17:49:00	20.89	0.1	-2.95	20.78	0.02	33.08
09Aug2016 - 17:50:00	20.89	0.1	-3.41	20.78	0.02	33.1
09Aug2016 - 17:51:00	20.89	0.1	-3.08	20.78	0.02	32.54
09Aug2016 - 17:52:00	20.89	0.1	-2.99	20.78	0.02	32.57
09Aug2016 - 17:53:00	20.89	0.1	-3	20.79	0.02	32.76
09Aug2016 - 17:54:00	20.89	0.1	-2.91	20.78	0.02	32.96
09Aug2016 - 17:55:00	20.89	0.1	-2.89	20.78	0.02	33.37
09Aug2016 - 17:56:00	20.89	0.1	-2.6	20.78	0.02	33.08

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
09Aug2016 - 17:57:00	20.9	0.1	-2.54	20.78	0.02	32.87
09Aug2016 - 17:58:00	20.89	0.1	-3.2	20.78	0.02	32.14
09Aug2016 - 17:59:00	20.89	0.1	-3.19	20.78	0.02	31.9
09Aug2016 - 18:00:00	20.9	0.1	-3.48	20.78	0.02	31.47
09Aug2016 - 18:01:00	20.9	0.1	-3.51	20.78	0.02	31.44
09Aug2016 - 18:02:00	20.89	0.1	-3.62	20.78	0.02	32.25
09Aug2016 - 18:03:00	20.9	0.1	-3.21	20.79	0.02	32.73
09Aug2016 - 18:04:00	20.9	0.1	-2.81	20.78	0.02	32.54
09Aug2016 - 18:05:00	20.9	0.1	-3.17	20.78	0.02	33.05
09Aug2016 - 18:06:00	20.89	0.1	-3.31	20.78	0.02	33.27
09Aug2016 - 18:07:00	20.9	0.1	-3.25	20.78	0.02	33.19
09Aug2016 - 18:08:00	20.89	0.1	-3.17	20.78	0.02	32.76
09Aug2016 - 18:09:00	20.89	0.1	-3.37	20.78	0.02	32.58
09Aug2016 - 18:10:00	20.89	0.1	-3.16	20.78	0.02	32.78
09Aug2016 - 18:11:00	20.9	0.1	-2.9	20.78	0.02	32.56
09Aug2016 - 18:12:00	20.9	0.1	-2.99	20.78	0.02	32.56
09Aug2016 - 18:13:00	20.89	0.1	-2.84	20.78	0.02	32.71
09Aug2016 - 18:14:00	20.89	0.1	-2.64	20.78	0.02	32.88
09Aug2016 - 18:15:00	20.89	0.1	-3.02	20.78	0.02	33.28
09Aug2016 - 18:16:00	20.89	0.1	-3.24	20.78	0.02	33.26
09Aug2016 - 18:17:00	20.89	0.1	-3.18	20.78	0.02	33.4
09Aug2016 - 18:18:00	20.89	0.1	-2.95	20.77	0.02	33.01
09Aug2016 - 18:19:00	20.89	0.1	-3.05	20.78	0.02	32.72
09Aug2016 - 18:20:00	20.89	0.1	-3.13	20.78	0.02	32.06
09Aug2016 - 18:21:00	20.89	0.1	-3.23	20.79	0.02	32.52
09Aug2016 - 18:22:00	20.89	0.1	-3.26	20.78	0.02	32.8
09Aug2016 - 18:23:00	20.89	0.1	-3.43	20.78	0.02	32.91
09Aug2016 - 18:24:00	20.89	0.1	-3.14	20.78	0.02	32.64
09Aug2016 - 18:25:00	20.89	0.1	-3.22	20.78	0.02	32.53
09Aug2016 - 18:26:00	20.89	0.1	-3.45	20.78	0.02	33.26
09Aug2016 - 18:27:00	20.89	0.1	-3.16	20.78	0.02	32.98
09Aug2016 - 18:28:00	20.89	0.1	-3.1	20.78	0.02	32.59
09Aug2016 - 18:29:00	20.89	0.1	-2.91	20.78	0.02	33.03
09Aug2016 - 18:30:00	20.89	0.1	-2.81	20.78	0.02	33.68
09Aug2016 - 18:31:00	20.89	0.1	-3.44	20.77	0.02	33.67
09Aug2016 - 18:32:00	20.89	0.1	-3.47	20.77	0.02	32.25
09Aug2016 - 18:33:00	20.89	0.1	-3.62	20.78	0.02	32.13
09Aug2016 - 18:34:00	20.9	0.1	-3.83	20.78	0.02	32.71
09Aug2016 - 18:35:00	20.89	0.1	-3.41	20.78	0.02	33.06
09Aug2016 - 18:36:00	20.89	0.1	-3.16	20.78	0.02	33.58
09Aug2016 - 18:37:00	20.89	0.1	-3.22	20.78	0.02	34.32
09Aug2016 - 18:38:00	20.89	0.1	-2.99	20.77	0.02	34.52
09Aug2016 - 18:39:00	20.89	0.1	-3.51	20.78	0.02	34.81
09Aug2016 - 18:40:00	20.89	0.1	-3.19	20.77	0.02	34.63
09Aug2016 - 18:41:00	20.89	0.1	-3.05	20.78	0.02	34.97
09Aug2016 - 18:42:00	20.89	0.1	-3.28	20.77	0.02	34.91
09Aug2016 - 18:43:00	20.88	0.1	-3.22	20.78	0.02	34.49
09Aug2016 - 18:44:00	20.89	0.1	-3.49	20.78	0.02	34.44
09Aug2016 - 18:45:00	20.89	0.1	-3.92	20.78	0.02	34.25
09Aug2016 - 18:46:00	20.89	0.1	-3.91	20.77	0.02	34.73
09Aug2016 - 18:47:00	20.89	0.1	-3.98	20.77	0.02	35.06
09Aug2016 - 18:48:00	20.88	0.1	-3.66	20.77	0.02	35.54
09Aug2016 - 18:49:00	20.89	0.1	-3.76	20.78	0.02	35.19
09Aug2016 - 18:50:00	20.89	0.1	-3.59	20.77	0.02	34.55
09Aug2016 - 18:51:00	20.89	0.1	-3.92	20.78	0.02	33.84
09Aug2016 - 18:52:00	20.89	0.1	-3.98	20.78	0.02	33.33
09Aug2016 - 18:53:00	20.88	0.1	-4.11	20.78	0.02	33.2
09Aug2016 - 18:54:00	20.89	0.1	-3.62	20.78	0.02	34.15
09Aug2016 - 18:55:00	20.89	0.1	-3.59	20.78	0.02	34.16
09Aug2016 - 18:56:00	20.89	0.1	-4.06	20.77	0.02	34.54
09Aug2016 - 18:57:00	20.89	0.1	-4.01	20.77	0.02	34.28
09Aug2016 - 18:58:00	20.89	0.1	-3.75	20.78	0.02	34.11
09Aug2016 - 18:59:00	20.89	0.1	-3.49	20.77	0.02	34.4
09Aug2016 - 19:00:00	20.89	0.1	-3.59	20.77	0.02	34.91
09Aug2016 - 19:01:00	20.89	0.1	-3.78	20.77	0.02	34.56
09Aug2016 - 19:02:00	20.9	0.1	-4.05	20.77	0.02	34.45
09Aug2016 - 19:03:00	20.9	0.1	-3.68	20.78	0.02	35.13
09Aug2016 - 19:04:00	20.89	0.1	-3.57	20.78	0.02	34.62
09Aug2016 - 19:05:00	20.89	0.1	-3.12	20.78	0.02	34.3
09Aug2016 - 19:06:00	20.9	0.1	-3.31	20.78	0.02	34.01
09Aug2016 - 19:07:00	20.9	0.1	-3.34	20.77	0.02	34.91
09Aug2016 - 19:08:00	20.9	0.1	-3.3	20.78	0.02	35.32
09Aug2016 - 19:09:00	20.9	0.1	-3.61	20.78	0.02	35.36
09Aug2016 - 19:10:00	20.89	0.1	-3.2	20.77	0.02	35.56
09Aug2016 - 19:11:00	20.89	0.1	-3.36	20.78	0.02	35.19
09Aug2016 - 19:12:00	20.89	0.1	-3.85	20.78	0.02	34.95
09Aug2016 - 19:13:00	20.9	0.1	-3.75	20.78	0.02	34.9
09Aug2016 - 19:14:00	20.9	0.1	-3.59	20.77	0.02	34.87
09Aug2016 - 19:15:00	20.9	0.1	-3.83	20.77	0.02	34.56
09Aug2016 - 19:16:00	20.9	0.1	-3.72	20.77	0.02	35.04
09Aug2016 - 19:17:00	20.9	0.1	-3.68	20.77	0.02	34.85
09Aug2016 - 19:18:00	20.9	0.1	-3.83	20.78	0.02	34.69
09Aug2016 - 19:19:00	20.9	0.1	-3.95	20.78	0.02	34.15
09Aug2016 - 19:20:00	20.9	0.1	-4.13	20.78	0.02	34.48
09Aug2016 - 19:21:00	20.9	0.1	-4.15	20.78	0.02	35.13
09Aug2016 - 19:22:00	20.89	0.1	-3.7	20.77	0.02	36.04
09Aug2016 - 19:23:00	20.9	0.1	-3.81	20.77	0.02	35.33

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
09Aug2016 - 19:24:00	20.9	0.1	-4.01	20.77	0.02	35.17
09Aug2016 - 19:25:00	20.9	0.1	-3.88	20.78	0.02	35.52
09Aug2016 - 19:26:00	20.9	0.1	-3.6	20.77	0.02	35.71
09Aug2016 - 19:27:00	20.9	0.1	-3.67	20.77	0.02	35.41
09Aug2016 - 19:28:00	20.89	0.1	-3.64	20.78	0.02	34.44
09Aug2016 - 19:29:00	20.9	0.1	-3.91	20.78	0.02	35.2
09Aug2016 - 19:30:00	20.9	0.1	-4.12	20.78	0.02	34.37
09Aug2016 - 19:31:00	20.9	0.1	-4	20.77	0.02	35.15
09Aug2016 - 19:32:00	20.89	0.1	-4.2	20.77	0.02	35.26
09Aug2016 - 19:33:00	20.9	0.1	-4.03	20.77	0.02	35.87
09Aug2016 - 19:34:00	20.9	0.1	-4.1	20.77	0.02	35.87
09Aug2016 - 19:35:00	20.9	0.1	-3.62	20.78	0.02	35.45
09Aug2016 - 19:36:00	20.9	0.1	-3.98	20.78	0.02	35.34
09Aug2016 - 19:37:00	20.9	0.1	-3.94	20.77	0.02	35.12
09Aug2016 - 19:38:00	20.9	0.1	-4.34	20.77	0.02	35.19
09Aug2016 - 19:39:00	20.9	0.1	-4.49	20.77	0.02	34.98
09Aug2016 - 19:40:00	20.9	0.1	-4.36	20.76	0.02	35.14
09Aug2016 - 19:41:00	20.9	0.1	-4.28	20.77	0.02	35.6
09Aug2016 - 19:42:00	20.9	0.1	-4.3	20.77	0.02	35.46
09Aug2016 - 19:43:00	20.88	0.1	-3.76	20.77	0.02	35.78
09Aug2016 - 19:44:00	20.89	0.1	-4.04	20.78	0.02	35.04
09Aug2016 - 19:45:00	20.9	0.1	-4.21	20.78	0.02	35.02
09Aug2016 - 19:46:00	20.9	0.1	-4.24	20.78	0.02	35.33
09Aug2016 - 19:47:00	20.9	0.1	-4.04	20.78	0.02	35.53
09Aug2016 - 19:48:00	20.9	0.1	-3.75	20.77	0.02	36.24
09Aug2016 - 19:49:00	20.9	0.1	-4.5	20.77	0.02	36.7
09Aug2016 - 19:50:00	20.9	0.1	-4.28	20.77	0.02	35.39
09Aug2016 - 19:51:00	20.9	0.1	-4.21	20.77	0.02	35.14
09Aug2016 - 19:52:00	20.9	0.1	-3.95	20.77	0.02	34.81
09Aug2016 - 19:53:00	20.9	0.1	-4.18	20.78	0.02	35.65
09Aug2016 - 19:54:00	20.9	0.1	-3.81	20.77	0.02	35.58
09Aug2016 - 19:55:00	20.9	0.1	-4.17	20.77	0.02	35.49
09Aug2016 - 19:56:00	20.9	0.1	-4.25	20.77	0.02	35.11
09Aug2016 - 19:57:00	20.9	0.1	-4.45	20.77	0.02	35.53
09Aug2016 - 19:58:00	20.9	0.1	-4.33	20.77	0.02	35.57
09Aug2016 - 19:59:00	20.9	0.1	-4.32	20.78	0.02	35.97
09Aug2016 - 20:00:00	20.9	0.1	-4.49	20.78	0.02	36
09Aug2016 - 20:01:00	20.9	0.1	-4.16	20.78	0.02	35.98
09Aug2016 - 20:02:00	20.9	0.1	-4.09	20.78	0.02	35.98
09Aug2016 - 20:03:00	20.89	0.1	-4.29	20.78	0.02	35.93
09Aug2016 - 20:04:00	20.9	0.1	-4.34	20.78	0.02	35.94
09Aug2016 - 20:05:00	20.89	0.1	-4.16	20.78	0.02	36.18
09Aug2016 - 20:06:00	20.9	0.1	-4.47	20.78	0.02	36.1
09Aug2016 - 20:07:00	20.9	0.1	-4.52	20.78	0.02	37.33
09Aug2016 - 20:08:00	20.9	0.1	-4.55	20.78	0.02	37.85
09Aug2016 - 20:09:00	20.9	0.1	-4.44	20.78	0.02	38.91
09Aug2016 - 20:10:00	20.89	0.1	-4.22	20.78	0.02	39.12
09Aug2016 - 20:11:00	20.9	0.1	-4.57	20.78	0.02	40.03
09Aug2016 - 20:12:00	20.9	0.1	-4.55	20.78	0.02	39.83
09Aug2016 - 20:13:00	20.9	0.1	-4.75	20.78	0.02	39.41
09Aug2016 - 20:14:00	20.9	0.1	-4.53	20.78	0.02	39.45
09Aug2016 - 20:15:00	20.9	0.1	-4.66	20.78	0.02	39.4
09Aug2016 - 20:16:00	20.9	0.1	-4.4	20.79	0.02	39.15
09Aug2016 - 20:17:00	20.9	0.1	-4.16	20.79	0.02	39.34
09Aug2016 - 20:18:00	20.9	0.1	-4.11	20.78	0.02	38.6
09Aug2016 - 20:19:00	20.9	0.1	-4.11	20.79	0.02	38.44
09Aug2016 - 20:20:00	20.91	0.1	-4.49	20.79	0.02	38.44
09Aug2016 - 20:21:00	20.91	0.1	-4.26	20.79	0.02	38.49
09Aug2016 - 20:22:00	20.91	0.1	-4.24	20.79	0.02	38.74
09Aug2016 - 20:23:00	20.91	0.1	-4.39	20.79	0.02	39.26
09Aug2016 - 20:24:00	20.91	0.1	-4.41	20.79	0.02	38.59
09Aug2016 - 20:25:00	20.91	0.1	-4.55	20.79	0.02	38.51
09Aug2016 - 20:26:00	20.91	0.1	-4.4	20.79	0.02	38.62
09Aug2016 - 20:27:00	20.91	0.1	-4.37	20.79	0.02	39.13
09Aug2016 - 20:28:00	20.91	0.1	-4.37	20.79	0.02	39.34
09Aug2016 - 20:29:00	20.91	0.1	-4.63	20.79	0.02	39.71
09Aug2016 - 20:30:00	20.91	0.1	-4.78	20.78	0.02	38.3
09Aug2016 - 20:31:00	20.91	0.1	-4.28	20.78	0.02	38.07
09Aug2016 - 20:32:00	20.91	0.1	-4.62	20.79	0.02	38.33
09Aug2016 - 20:33:00	20.91	0.1	-4.94	20.79	0.02	37.42
09Aug2016 - 20:34:00	20.91	0.1	-4.47	20.79	0.02	37
09Aug2016 - 20:35:00	20.91	0.1	-4.48	20.8	0.02	36.31
09Aug2016 - 20:36:00	20.91	0.1	-4.97	20.8	0.02	36.97
09Aug2016 - 20:37:00	20.91	0.1	-4.68	20.79	0.02	37.38
09Aug2016 - 20:38:00	20.92	0.1	-4.7	20.79	0.02	38.03
09Aug2016 - 20:39:00	20.91	0.1	-4.8	20.79	0.02	38.17
09Aug2016 - 20:40:00	20.91	0.1	-5.08	20.79	0.02	38.91
09Aug2016 - 20:41:00	20.91	0.1	-4.97	20.79	0.02	37.75
09Aug2016 - 20:42:00	20.91	0.1	-4.81	20.79	0.02	38.2
09Aug2016 - 20:43:00	20.91	0.1	-4.47	20.8	0.02	37.97
09Aug2016 - 20:44:00	20.91	0.1	-4.49	20.79	0.02	38.03
09Aug2016 - 20:45:00	20.91	0.1	-4.87	20.79	0.02	38.28
09Aug2016 - 20:46:00	20.91	0.1	-4.8	20.79	0.02	37.98
09Aug2016 - 20:47:00	20.91	0.1	-4.29	20.79	0.02	38.35
09Aug2016 - 20:48:00	20.92	0.1	-4.59	20.79	0.02	38.29
09Aug2016 - 20:49:00	20.92	0.1	-4.49	20.79	0.02	38.08
09Aug2016 - 20:50:00	20.91	0.1	-4.49	20.79	0.02	38.23

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
09Aug2016 - 20:51:00	20.91	0.1	-4.46	20.79	0.02	38.33
09Aug2016 - 20:52:00	20.92	0.1	-4.93	20.79	0.02	37.13
09Aug2016 - 20:53:00	20.92	0.1	-4.76	20.79	0.02	36.74
09Aug2016 - 20:54:00	20.92	0.1	-5	20.79	0.02	37.39
09Aug2016 - 20:55:00	20.92	0.1	-4.8	20.79	0.02	37.13
09Aug2016 - 20:56:00	20.92	0.1	-4.73	20.8	0.02	36.65
09Aug2016 - 20:57:00	20.91	0.1	-4.47	20.79	0.02	36.93
09Aug2016 - 20:58:00	20.92	0.1	-4.44	20.79	0.02	37.69
09Aug2016 - 20:59:00	20.91	0.1	-4.29	20.79	0.02	37.85
09Aug2016 - 21:00:00	20.92	0.1	-4.4	20.79	0.02	37.82
09Aug2016 - 21:01:00	20.92	0.1	-4.4	20.79	0.02	38.09
09Aug2016 - 21:02:00	20.92	0.1	-4.64	20.79	0.02	37.9
09Aug2016 - 21:03:00	20.92	0.1	-4.75	20.79	0.02	37.39
09Aug2016 - 21:04:00	20.92	0.1	-4.9	20.79	0.02	38.14
09Aug2016 - 21:05:00	20.92	0.1	-5.09	20.79	0.02	37.59
09Aug2016 - 21:06:00	20.92	0.1	-4.87	20.79	0.02	36.34
09Aug2016 - 21:07:00	20.92	0.1	-5.1	20.79	0.02	36
09Aug2016 - 21:08:00	20.92	0.1	-4.98	20.79	0.02	35.68
09Aug2016 - 21:09:00	20.92	0.1	-4.89	20.79	0.02	35.58
09Aug2016 - 21:10:00	20.92	0.1	-4.67	20.8	0.02	36.8
09Aug2016 - 21:11:00	20.92	0.1	-4.7	20.79	0.02	36.96
09Aug2016 - 21:12:00	20.92	0.1	-4.92	20.79	0.02	37.33
09Aug2016 - 21:13:00	20.92	0.1	-4.61	20.79	0.02	37.36
09Aug2016 - 21:14:00	20.92	0.1	-4.83	20.79	0.02	37.4
09Aug2016 - 21:15:00	20.93	0.1	-5.05	20.79	0.02	37.88
09Aug2016 - 21:16:00	20.93	0.1	-5.3	20.79	0.02	37.52
09Aug2016 - 21:17:00	20.92	0.1	-4.9	20.79	0.02	37.93
09Aug2016 - 21:18:00	20.92	0.1	-5.1	20.79	0.02	37.56
09Aug2016 - 21:19:00	20.93	0.1	-4.98	20.79	0.02	37.35
09Aug2016 - 21:20:00	20.92	0.1	-4.8	20.79	0.02	37
09Aug2016 - 21:21:00	20.93	0.1	-4.93	20.79	0.02	36.85
09Aug2016 - 21:22:00	20.92	0.1	-4.88	20.8	0.02	37.27
09Aug2016 - 21:23:00	20.93	0.1	-5.19	20.79	0.02	37.15
09Aug2016 - 21:24:00	20.93	0.1	-5.18	20.79	0.02	37.6
09Aug2016 - 21:25:00	20.92	0.1	-5.05	20.79	0.02	37.7
09Aug2016 - 21:26:00	20.93	0.1	-4.96	20.79	0.02	37.18
09Aug2016 - 21:27:00	20.92	0.1	-5.1	20.79	0.02	37.35
09Aug2016 - 21:28:00	20.93	0.1	-5.32	20.79	0.02	37.26
09Aug2016 - 21:29:00	20.92	0.1	-4.92	20.79	0.02	36.39
09Aug2016 - 21:30:00	20.92	0.1	-4.73	20.79	0.02	36.08
09Aug2016 - 21:31:00	20.92	0.1	-5.26	20.79	0.02	36.44
09Aug2016 - 21:32:00	20.92	0.1	-5.39	20.79	0.02	38.02
09Aug2016 - 21:33:00	20.93	0.1	-4.89	20.79	0.02	38.22
09Aug2016 - 21:34:00	20.92	0.1	-5.05	20.79	0.02	37.87
09Aug2016 - 21:35:00	20.92	0.1	-5	20.79	0.02	37.39
09Aug2016 - 21:36:00	20.92	0.1	-5.28	20.79	0.02	37.89
09Aug2016 - 21:37:00	20.92	0.1	-5	20.79	0.02	37.36
09Aug2016 - 21:38:00	20.92	0.1	-5.31	20.79	0.02	37.74
09Aug2016 - 21:39:00	20.92	0.1	-5.03	20.79	0.02	38.15
09Aug2016 - 21:40:00	20.92	0.1	-4.98	20.79	0.02	38.45
09Aug2016 - 21:41:00	20.92	0.1	-5.27	20.79	0.02	38.67
09Aug2016 - 21:42:00	20.93	0.1	-5.24	20.79	0.02	38.54
09Aug2016 - 21:43:00	20.92	0.1	-5.04	20.79	0.02	38.46
09Aug2016 - 21:44:00	20.92	0.1	-4.92	20.79	0.02	38.45
09Aug2016 - 21:45:00	20.93	0.1	-5.07	20.79	0.02	38.19
09Aug2016 - 21:46:00	20.93	0.1	-5.33	20.79	0.02	36.82
09Aug2016 - 21:47:00	20.92	0.1	-5.14	20.79	0.02	37.07
09Aug2016 - 21:48:00	20.92	0.1	-4.86	20.79	0.02	36.44
09Aug2016 - 21:49:00	20.92	0.1	-4.99	20.79	0.02	37.48
09Aug2016 - 21:50:00	20.92	0.1	-4.68	20.79	0.02	37.63
09Aug2016 - 21:51:00	20.93	0.1	-4.58	20.79	0.02	37.41
09Aug2016 - 21:52:00	20.93	0.1	-4.64	20.79	0.02	38.41
09Aug2016 - 21:53:00	20.92	0.1	-4.91	20.79	0.02	38.73
09Aug2016 - 21:54:00	20.92	0.1	-5.04	20.79	0.02	38.7
09Aug2016 - 21:55:00	20.92	0.1	-5.04	20.79	0.02	38.91
09Aug2016 - 21:56:00	20.93	0.1	-5.04	20.79	0.02	39.35
09Aug2016 - 21:57:00	20.92	0.1	-5.22	20.79	0.02	38.95
09Aug2016 - 21:58:00	20.93	0.1	-5.01	20.79	0.02	38.7
09Aug2016 - 21:59:00	20.93	0.1	-4.78	20.79	0.02	37.78
09Aug2016 - 22:00:00	20.92	0.1	-4.86	20.79	0.02	38.72
09Aug2016 - 22:01:00	20.92	0.1	-5.1	20.79	0.02	38.81
09Aug2016 - 22:02:00	20.92	0.1	-5.22	20.79	0.02	38.53
09Aug2016 - 22:03:00	20.92	0.1	-5.15	20.79	0.02	39.18
09Aug2016 - 22:04:00	20.92	0.1	-4.95	20.79	0.02	38.35
09Aug2016 - 22:05:00	20.93	0.1	-4.69	20.79	0.02	37.33
09Aug2016 - 22:06:00	20.92	0.1	-4.79	20.78	0.02	37.54
09Aug2016 - 22:07:00	20.92	0.1	-4.95	20.79	0.02	39.03
09Aug2016 - 22:08:00	20.93	0.1	-5.23	20.79	0.02	39.54
09Aug2016 - 22:09:00	20.92	0.1	-5.49	20.79	0.02	38.89
09Aug2016 - 22:10:00	20.93	0.1	-5.34	20.79	0.02	39.31
09Aug2016 - 22:11:00	20.92	0.1	-5.36	20.79	0.02	39.2
09Aug2016 - 22:12:00	20.92	0.1	-4.93	20.79	0.02	38.83
09Aug2016 - 22:13:00	20.92	0.1	-5.54	20.79	0.02	38.68
09Aug2016 - 22:14:00	20.92	0.1	-5.53	20.79	0.02	38.84
09Aug2016 - 22:15:00	20.92	0.1	-5.16	20.79	0.02	39.4
09Aug2016 - 22:16:00	20.93	0.1	-5.09	20.79	0.02	39.38
09Aug2016 - 22:17:00	20.93	0.1	-5.1	20.79	0.02	39.72

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
09Aug2016 - 22:18:00	20.92	0.1	-5.13	20.78	0.02	39.91
09Aug2016 - 22:19:00	20.93	0.1	-5.2	20.79	0.02	39.82
09Aug2016 - 22:20:00	20.92	0.1	-5.03	20.79	0.02	39.92
09Aug2016 - 22:21:00	20.93	0.1	-4.99	20.79	0.02	40.02
09Aug2016 - 22:22:00	20.92	0.1	-4.46	20.79	0.02	40.23
09Aug2016 - 22:23:00	20.93	0.1	-4.93	20.79	0.02	39.8
09Aug2016 - 22:24:00	20.93	0.1	-4.78	20.79	0.02	40.27
09Aug2016 - 22:25:00	20.92	0.1	-4.51	20.79	0.02	40.25
09Aug2016 - 22:26:00	20.93	0.1	-4.54	20.79	0.02	39.28
09Aug2016 - 22:27:00	20.92	0.1	-4.66	20.79	0.02	38.18
09Aug2016 - 22:28:00	20.92	0.1	-5.09	20.79	0.02	38.72
09Aug2016 - 22:29:00	20.92	0.1	-5.02	20.79	0.02	38.89
09Aug2016 - 22:30:00	20.92	0.1	-4.56	20.79	0.02	39.91
09Aug2016 - 22:31:00	20.92	0.1	-4.58	20.78	0.02	40.77
09Aug2016 - 22:32:00	20.93	0.1	-5.02	20.79	0.02	40.36
09Aug2016 - 22:33:00	20.92	0.1	-4.71	20.79	0.02	40.29
09Aug2016 - 22:34:00	20.92	0.1	-4.29	20.78	0.02	40.44
09Aug2016 - 22:35:00	20.92	0.1	-4.54	20.79	0.02	40.68
09Aug2016 - 22:36:00	20.92	0.1	-5.03	20.79	0.02	40.86
09Aug2016 - 22:37:00	20.92	0.1	-4.8	20.79	0.02	40.18
09Aug2016 - 22:38:00	20.92	0.1	-5	20.8	0.02	40.51
09Aug2016 - 22:39:00	20.92	0.1	-5.13	20.79	0.02	40.97
09Aug2016 - 22:40:00	20.92	0.1	-4.5	20.79	0.02	40.25
09Aug2016 - 22:41:00	20.93	0.1	-4.66	20.79	0.02	40.3
09Aug2016 - 22:42:00	20.92	0.1	-4.9	20.79	0.02	38.96
09Aug2016 - 22:43:00	20.92	0.1	-5.36	20.79	0.02	39.74
09Aug2016 - 22:44:00	20.92	0.1	-5.12	20.79	0.02	40.43
09Aug2016 - 22:45:00	20.92	0.1	-5.3	20.79	0.02	40.74
09Aug2016 - 22:46:00	20.92	0.1	-4.75	20.79	0.02	40.72
09Aug2016 - 22:47:00	20.93	0.1	-5.18	20.79	0.02	40.74
09Aug2016 - 22:48:00	20.92	0.1	-5.05	20.79	0.02	40.88
09Aug2016 - 22:49:00	20.92	0.1	-4.82	20.79	0.02	41.33
09Aug2016 - 22:50:00	20.92	0.1	-4.71	20.79	0.02	41.62
09Aug2016 - 22:51:00	20.92	0.1	-4.81	20.79	0.02	41.46
09Aug2016 - 22:52:00	20.92	0.1	-5.08	20.79	0.02	41.86
09Aug2016 - 22:53:00	20.92	0.1	-5.39	20.79	0.02	41.28
09Aug2016 - 22:54:00	20.92	0.1	-5.62	20.79	0.02	41.5
09Aug2016 - 22:55:00	20.92	0.1	-4.99	20.79	0.02	41.14
09Aug2016 - 22:56:00	20.92	0.1	-5.27	20.79	0.02	41.79
09Aug2016 - 22:57:00	20.92	0.1	-5.22	20.79	0.02	41.24
09Aug2016 - 22:58:00	20.92	0.1	-5.3	20.79	0.02	41.39
09Aug2016 - 22:59:00	20.92	0.1	-5.42	20.78	0.02	41.6
09Aug2016 - 23:00:00	20.92	0.1	-5.24	20.79	0.02	41.34
09Aug2016 - 23:01:00	20.92	0.1	-5.38	20.79	0.02	40.63
09Aug2016 - 23:02:00	20.92	0.1	-5.13	20.79	0.02	40.92
09Aug2016 - 23:03:00	20.92	0.1	-4.99	20.79	0.02	40.8
09Aug2016 - 23:04:00	20.92	0.1	-5.24	20.79	0.02	41.11
09Aug2016 - 23:05:00	20.92	0.1	-5.29	20.79	0.02	41.1
09Aug2016 - 23:06:00	20.92	0.1	-5.07	20.79	0.02	41.79
09Aug2016 - 23:07:00	20.91	0.1	-5.36	20.79	0.02	43.26
09Aug2016 - 23:08:00	20.92	0.1	-5.14	20.78	0.02	43.32
09Aug2016 - 23:09:00	20.92	0.1	-5.48	20.78	0.02	43.56
09Aug2016 - 23:10:00	20.92	0.1	-5.5	20.79	0.02	42.88
09Aug2016 - 23:11:00	20.92	0.1	-5.32	20.79	0.02	42.42
09Aug2016 - 23:12:00	20.92	0.1	-5.65	20.79	0.02	40.94
09Aug2016 - 23:13:00	20.92	0.1	-5.45	20.79	0.02	41.09
09Aug2016 - 23:14:00	20.92	0.1	-5.01	20.79	0.02	42.95
09Aug2016 - 23:15:00	20.92	0.1	-4.99	20.78	0.02	43.88
09Aug2016 - 23:16:00	20.92	0.1	-4.93	20.78	0.02	42.73
09Aug2016 - 23:17:00	20.92	0.1	-5.34	20.79	0.02	41.06
09Aug2016 - 23:18:00	20.91	0.1	-5.18	20.79	0.02	41.32
09Aug2016 - 23:19:00	20.92	0.1	-4.86	20.79	0.02	41.8
09Aug2016 - 23:20:00	20.92	0.1	-4.93	20.79	0.02	42.84
09Aug2016 - 23:21:00	20.93	0.1	-4.98	20.78	0.02	43.13
09Aug2016 - 23:22:00	20.93	0.1	-4.75	20.78	0.02	43.3
09Aug2016 - 23:23:00	20.92	0.1	-5.24	20.79	0.02	43.37
09Aug2016 - 23:24:00	20.92	0.1	-4.66	20.79	0.02	43.22
09Aug2016 - 23:25:00	20.92	0.1	-4.82	20.79	0.02	42.75
09Aug2016 - 23:26:00	20.92	0.1	-5.38	20.79	0.02	42.82
09Aug2016 - 23:27:00	20.92	0.1	-5.41	20.79	0.02	43.45
09Aug2016 - 23:28:00	20.92	0.1	-4.98	20.78	0.02	43.31
09Aug2016 - 23:29:00	20.92	0.1	-5.15	20.79	0.02	43.9
09Aug2016 - 23:30:00	20.92	0.1	-5.1	20.79	0.02	43.77
09Aug2016 - 23:31:00	20.92	0.1	-5.24	20.79	0.02	43.87
09Aug2016 - 23:32:00	20.92	0.1	-5.21	20.79	0.02	42.8
09Aug2016 - 23:33:00	20.92	0.1	-5.2	20.79	0.02	42.59
09Aug2016 - 23:34:00	20.92	0.1	-5.25	20.79	0.02	41.83
09Aug2016 - 23:35:00	20.92	0.1	-5.21	20.79	0.02	42.55
09Aug2016 - 23:36:00	20.93	0.1	-5.42	20.79	0.02	43.23
09Aug2016 - 23:37:00	20.92	0.1	-5.22	20.79	0.02	43.97
09Aug2016 - 23:38:00	20.92	0.1	-4.84	20.79	0.02	44.12
09Aug2016 - 23:39:00	20.92	0.1	-5.03	20.79	0.02	44.22
09Aug2016 - 23:40:00	20.92	0.1	-4.62	20.79	0.02	44.2
09Aug2016 - 23:41:00	20.92	0.1	-5.22	20.79	0.02	44.18
09Aug2016 - 23:42:00	20.92	0.1	-5.19	20.79	0.02	43.59
09Aug2016 - 23:43:00	20.92	0.1	-5.26	20.79	0.02	43.71
09Aug2016 - 23:44:00	20.92	0.1	-5.21	20.79	0.02	43.93

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
09Aug2016 - 23:45:00	20.92	0.1	-4.71	20.79	0.02	43.98
09Aug2016 - 23:46:00	20.92	0.1	-4.61	20.79	0.02	44.16
09Aug2016 - 23:47:00	20.92	0.1	-4.96	20.79	0.02	42.72
09Aug2016 - 23:48:00	20.92	0.1	-4.92	20.79	0.02	43.02
09Aug2016 - 23:49:00	20.92	0.1	-4.76	20.79	0.02	43.45
09Aug2016 - 23:50:00	20.92	0.1	-4.8	20.79	0.02	44.14
09Aug2016 - 23:51:00	20.92	0.1	-4.89	20.79	0.02	44.55
09Aug2016 - 23:52:00	20.92	0.1	-5.19	20.78	0.02	44.37
09Aug2016 - 23:53:00	20.92	0.1	-5.03	20.79	0.02	44.65
09Aug2016 - 23:54:00	20.92	0.1	-4.66	20.79	0.02	44.35
09Aug2016 - 23:55:00	20.92	0.1	-4.46	20.79	0.02	44.85
09Aug2016 - 23:56:00	20.92	0.1	-4.76	20.79	0.02	44.57
09Aug2016 - 23:57:00	20.92	0.1	-4.47	20.79	0.02	43.92
09Aug2016 - 23:58:00	20.92	0.1	-4.65	20.79	0.02	44.9
09Aug2016 - 23:59:00	20.92	0.1	-4.8	20.79	0.02	45.2
10Aug2016 - 00:00:00	20.93	0.1	-4.74	20.79	0.02	45.57
10Aug2016 - 00:01:00	20.93	0.1	-5.01	20.79	0.02	45.23
10Aug2016 - 00:02:00	20.92	0.1	-4.28	20.79	0.02	44.5
10Aug2016 - 00:03:00	20.92	0.1	-4.24	20.79	0.02	43.13
10Aug2016 - 00:04:00	20.93	0.1	-4.66	20.79	0.02	43.11
10Aug2016 - 00:05:00	20.93	0.1	-4.71	20.79	0.02	44.11
10Aug2016 - 00:06:00	20.92	0.1	-4.86	20.79	0.02	44.72
10Aug2016 - 00:07:00	20.92	0.1	-4.68	20.79	0.02	44.5
10Aug2016 - 00:08:00	20.92	0.1	-4.93	20.79	0.02	45.45
10Aug2016 - 00:09:00	20.92	0.1	-4.63	20.79	0.02	44.84
10Aug2016 - 00:10:00	20.92	0.1	-4.65	20.79	0.02	44.77
10Aug2016 - 00:11:00	20.93	0.1	-5.16	20.79	0.02	45.23
10Aug2016 - 00:12:00	20.92	0.1	-4.98	20.79	0.02	45.58
10Aug2016 - 00:13:00	20.92	0.1	-4.45	20.79	0.02	45.64
10Aug2016 - 00:14:00	20.92	0.1	-4.44	20.79	0.02	45.27
10Aug2016 - 00:15:00	20.92	0.1	-5.02	20.79	0.02	44.49
10Aug2016 - 00:16:00	20.92	0.1	-4.81	20.79	0.02	44.25
10Aug2016 - 00:17:00	20.92	0.1	-4.66	20.79	0.02	44.69
10Aug2016 - 00:18:00	20.92	0.1	-4.34	20.79	0.02	45.67
10Aug2016 - 00:19:00	20.92	0.1	-4.52	20.79	0.02	45.25
10Aug2016 - 00:20:00	20.92	0.1	-4.37	20.78	0.02	44.27
10Aug2016 - 00:21:00	20.92	0.1	-4.66	20.78	0.02	43.9
10Aug2016 - 00:22:00	20.92	0.1	-5.13	20.79	0.02	44.44
10Aug2016 - 00:23:00	20.92	0.1	-4.92	20.79	0.02	44.01
10Aug2016 - 00:24:00	20.92	0.1	-5.29	20.8	0.02	43.54
10Aug2016 - 00:25:00	20.92	0.1	-5.11	20.79	0.02	44.48
10Aug2016 - 00:26:00	20.92	0.1	-4.99	20.79	0.02	45.25
10Aug2016 - 00:27:00	20.92	0.1	-5.14	20.79	0.02	45.02
10Aug2016 - 00:28:00	20.93	0.1	-4.88	20.79	0.02	46.22
10Aug2016 - 00:29:00	20.92	0.1	-4.97	20.78	0.02	45.25
10Aug2016 - 00:30:00	20.92	0.1	-4.99	20.78	0.02	44.86
10Aug2016 - 00:31:00	20.93	0.1	-5.12	20.78	0.02	44.44
10Aug2016 - 00:32:00	20.92	0.1	-5.28	20.79	0.02	44.75
10Aug2016 - 00:33:00	20.93	0.1	-5.26	20.79	0.02	45.56
10Aug2016 - 00:34:00	20.92	0.1	-5.73	20.8	0.02	44.8
10Aug2016 - 00:35:00	20.93	0.1	-5.42	20.79	0.02	45.26
10Aug2016 - 00:36:00	20.92	0.1	-5.67	20.79	0.02	45.95
10Aug2016 - 00:37:00	20.93	0.1	-5.27	20.78	0.02	45.78
10Aug2016 - 00:38:00	20.92	0.1	-5.19	20.78	0.02	46.18
10Aug2016 - 00:39:00	20.92	0.1	-5.1	20.78	0.02	45.52
10Aug2016 - 00:40:00	20.92	0.1	-5.33	20.79	0.02	45.49
10Aug2016 - 00:41:00	20.92	0.1	-5.26	20.79	0.02	45.8
10Aug2016 - 00:42:00	20.92	0.1	-5.54	20.79	0.02	44.92
10Aug2016 - 00:43:00	20.92	0.1	-5.25	20.8	0.02	44.79
10Aug2016 - 00:44:00	20.92	0.1	-5.45	20.79	0.02	44.93
10Aug2016 - 00:45:00	20.92	0.1	-4.91	20.79	0.02	44.89
10Aug2016 - 00:46:00	20.92	0.1	-5.22	20.79	0.02	45.33
10Aug2016 - 00:47:00	20.92	0.1	-5.13	20.79	0.02	46.04
10Aug2016 - 00:48:00	20.92	0.1	-4.7	20.78	0.02	45.96
10Aug2016 - 00:49:00	20.93	0.1	-4.81	20.78	0.02	45.02
10Aug2016 - 00:50:00	20.92	0.1	-5.07	20.8	0.02	43.79
10Aug2016 - 00:51:00	20.92	0.1	-4.9	20.79	0.02	43.39
10Aug2016 - 00:52:00	20.92	0.1	-4.72	20.79	0.02	44.22
10Aug2016 - 00:53:00	20.92	0.1	-4.95	20.79	0.02	45.33
10Aug2016 - 00:54:00	20.92	0.1	-4.91	20.78	0.02	45.59
10Aug2016 - 00:55:00	20.92	0.1	-5.01	20.79	0.02	45.3
10Aug2016 - 00:56:00	20.92	0.1	-5.11	20.79	0.02	45.61
10Aug2016 - 00:57:00	20.92	0.1	-5.01	20.79	0.02	45.59
10Aug2016 - 00:58:00	20.92	0.1	-5.09	20.79	0.02	45.4
10Aug2016 - 00:59:00	20.92	0.1	-4.72	20.79	0.02	43.82
10Aug2016 - 01:00:00	20.92	0.1	-4.89	20.78	0.02	43.64
10Aug2016 - 01:01:00	20.92	0.1	-4.63	20.79	0.02	44.19
10Aug2016 - 01:02:00	20.92	0.1	-4.72	20.79	0.02	45.07
10Aug2016 - 01:03:00	20.92	0.1	-4.94	20.79	0.02	44.57
10Aug2016 - 01:04:00	20.92	0.1	-4.63	20.79	0.02	45.06
10Aug2016 - 01:05:00	20.92	0.1	-4.72	20.79	0.02	45.57
10Aug2016 - 01:06:00	20.92	0.1	-5.05	20.79	0.02	46.14
10Aug2016 - 01:07:00	20.92	0.1	-5.03	20.79	0.02	45.65
10Aug2016 - 01:08:00	20.92	0.1	-4.74	20.79	0.02	46.22
10Aug2016 - 01:09:00	20.92	0.1	-5.1	20.79	0.02	46.09
10Aug2016 - 01:10:00	20.92	0.1	-5.43	20.79	0.02	45.13
10Aug2016 - 01:11:00	20.92	0.1	-5.07	20.79	0.02	45.36

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 01:12:00	20.92	0.1	-4.81	20.79	0.02	45.89
10Aug2016 - 01:13:00	20.92	0.1	-5.41	20.79	0.02	45.91
10Aug2016 - 01:14:00	20.92	0.1	-5.43	20.79	0.02	45.82
10Aug2016 - 01:15:00	20.92	0.1	-5.76	20.79	0.02	44.54
10Aug2016 - 01:16:00	20.92	0.1	-5.36	20.78	0.02	44.71
10Aug2016 - 01:17:00	20.92	0.1	-5.28	20.79	0.02	45.22
10Aug2016 - 01:18:00	20.92	0.1	-5.15	20.79	0.02	46.16
10Aug2016 - 01:19:00	20.92	0.1	-5.2	20.79	0.02	45.13
10Aug2016 - 01:20:00	20.92	0.1	-5.49	20.79	0.02	44.25
10Aug2016 - 01:21:00	20.92	0.1	-5.07	20.79	0.02	44.98
10Aug2016 - 01:22:00	20.92	0.1	-5.27	20.79	0.02	45.79
10Aug2016 - 01:23:00	20.92	0.1	-5.1	20.8	0.02	45.58
10Aug2016 - 01:24:00	20.92	0.1	-5.14	20.79	0.02	45.64
10Aug2016 - 01:25:00	20.92	0.1	-4.92	20.79	0.02	45.46
10Aug2016 - 01:26:00	20.92	0.1	-5.37	20.79	0.02	46.15
10Aug2016 - 01:27:00	20.91	0.1	-5.44	20.78	0.02	46.77
10Aug2016 - 01:28:00	20.92	0.1	-5.08	20.79	0.02	45.72
10Aug2016 - 01:29:00	20.92	0.1	-5.43	20.79	0.02	45.52
10Aug2016 - 01:30:00	20.92	0.1	-5.03	20.79	0.02	44.92
10Aug2016 - 01:31:00	20.92	0.1	-4.65	20.79	0.02	44.65
10Aug2016 - 01:32:00	20.92	0.1	-5.04	20.79	0.02	44.79
10Aug2016 - 01:33:00	20.92	0.1	-4.85	20.79	0.02	45.79
10Aug2016 - 01:34:00	20.91	0.1	-4.97	20.79	0.02	45.83
10Aug2016 - 01:35:00	20.92	0.1	-4.86	20.79	0.02	45.6
10Aug2016 - 01:36:00	20.92	0.1	-5.47	20.79	0.02	45.56
10Aug2016 - 01:37:00	20.92	0.1	-5.02	20.79	0.02	45.89
10Aug2016 - 01:38:00	20.92	0.1	-5.16	20.79	0.02	45.48
10Aug2016 - 01:39:00	20.92	0.1	-5.08	20.79	0.02	46.14
10Aug2016 - 01:40:00	20.92	0.1	-4.92	20.79	0.02	46.95
10Aug2016 - 01:41:00	20.92	0.1	-4.87	20.78	0.02	47.08
10Aug2016 - 01:42:00	20.92	0.1	-5.02	20.79	0.02	46.83
10Aug2016 - 01:43:00	20.92	0.1	-5.43	20.79	0.02	45.84
10Aug2016 - 01:44:00	20.92	0.1	-4.9	20.79	0.02	45.82
10Aug2016 - 01:45:00	20.91	0.1	-4.78	20.79	0.02	47.09
10Aug2016 - 01:46:00	20.89	0.1	-4.01	20.77	0.02	44.75
10Aug2016 - 01:47:00	20.92	0.1	-4.2	20.79	0.02	45.08
10Aug2016 - 01:48:00	20.93	0.1	-3.64	20.79	0.02	45.68
10Aug2016 - 01:49:00	20.93	0.1	-3.52	20.79	0.02	45.78
10Aug2016 - 01:50:00	20.92	0.1	-3.69	20.79	0.02	45.64
10Aug2016 - 01:51:00	20.92	0.1	-3.62	20.79	0.02	45.7
10Aug2016 - 01:52:00	20.92	0.1	-3.17	20.79	0.02	45.13
10Aug2016 - 01:53:00	20.92	0.1	-2.68	20.79	0.02	44.95
10Aug2016 - 01:54:00	20.92	0.1	-3	20.79	0.02	45.83
10Aug2016 - 01:55:00	20.92	0.1	-2.73	20.8	0.02	46.29
10Aug2016 - 01:56:00	20.92	0.1	-2.58	20.79	0.02	46.86
10Aug2016 - 01:57:00	20.92	0.1	-2.82	20.79	0.02	46.77
10Aug2016 - 01:58:00	20.92	0.1	-2.75	20.79	0.02	46.72
10Aug2016 - 01:59:00	20.92	0.1	-2.53	20.79	0.02	47.09
10Aug2016 - 02:00:00	20.92	0.1	-3.09	20.79	0.02	46.35
10Aug2016 - 02:01:00	20.92	0.1	-2.49	20.8	0.02	45.82
10Aug2016 - 02:02:00	20.93	0.1	-2.9	20.8	0.02	45.88
10Aug2016 - 02:03:00	20.92	0.1	-2.76	20.79	0.02	46.27
10Aug2016 - 02:04:00	20.92	0.1	-2.92	20.79	0.02	46.34
10Aug2016 - 02:05:00	20.92	0.1	-3.24	20.79	0.02	46.6
10Aug2016 - 02:06:00	20.92	0.1	-3.1	20.79	0.02	46.22
10Aug2016 - 02:07:00	20.92	0.1	-3.43	20.79	0.02	46.94
10Aug2016 - 02:08:00	20.92	0.1	-3.28	20.79	0.02	45.8
10Aug2016 - 02:09:00	20.92	0.1	-3.8	20.79	0.02	44.99
10Aug2016 - 02:10:00	20.92	0.1	-3.69	20.79	0.02	44.8
10Aug2016 - 02:11:00	20.92	0.1	-3.89	20.79	0.02	45.07
10Aug2016 - 02:12:00	20.92	0.1	-3.91	20.78	0.02	45.02
10Aug2016 - 02:13:00	20.92	0.1	-4.02	20.78	0.02	46.11
10Aug2016 - 02:14:00	20.92	0.1	-4.35	20.79	0.02	46.95
10Aug2016 - 02:15:00	20.92	0.1	-4.12	20.79	0.02	46.52
10Aug2016 - 02:16:00	20.92	0.1	-3.92	20.79	0.02	46.18
10Aug2016 - 02:17:00	20.92	0.1	-3.76	20.79	0.02	46.49
10Aug2016 - 02:18:00	20.92	0.1	-3.58	20.79	0.02	46.54
10Aug2016 - 02:19:00	20.92	0.1	-3.52	20.79	0.02	46.68
10Aug2016 - 02:20:00	20.92	0.1	-3.76	20.79	0.02	46.34
10Aug2016 - 02:21:00	20.92	0.1	-3.11	20.79	0.02	46.29
10Aug2016 - 02:22:00	20.92	0.1	-3.49	20.79	0.02	46.32
10Aug2016 - 02:23:00	20.92	0.1	-3.41	20.79	0.02	46.16
10Aug2016 - 02:24:00	20.92	0.1	-3.04	20.79	0.02	46.63
10Aug2016 - 02:25:00	20.92	0.1	-3.4	20.79	0.02	46.23
10Aug2016 - 02:26:00	20.92	0.1	-3.4	20.79	0.02	45.78
10Aug2016 - 02:27:00	20.93	0.1	-3.47	20.79	0.02	44.81
10Aug2016 - 02:28:00	20.92	0.1	-3.02	20.79	0.02	44.88
10Aug2016 - 02:29:00	20.93	0.1	-3.05	20.79	0.02	45.21
10Aug2016 - 02:30:00	20.93	0.1	-4.18	20.8	0.02	47.51
10Aug2016 - 02:31:00	20.92	0.1	-4.23	20.79	0.02	49.11
10Aug2016 - 02:32:00	20.89	0.1	4.43	20.76	0.02	53.71
10Aug2016 - 02:33:00	20.84	0.1	-4.42	20.7	0.02	56.61
10Aug2016 - 02:34:00	20.82	0.1	-4.56	20.68	0.02	57.2
10Aug2016 - 02:35:00	20.74	0.1	7.21	20.64	0.02	71.43
10Aug2016 - 02:36:00	20.7	0.1	16.4	20.52	0.02	54.81
10Aug2016 - 02:37:00	20.82	0.1	22.65	20.68	0.02	54.32
10Aug2016 - 02:38:00	20.82	0.1	29.63	20.68	0.02	55.16

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 02:39:00	20.82	0.1	34.55	20.69	0.02	55.81
10Aug2016 - 02:40:00	20.82	0.1	41.34	20.68	0.02	56.24
10Aug2016 - 02:41:00	20.82	0.1	47.35	20.68	0.02	56.31
10Aug2016 - 02:42:00	20.83	0.1	53.26	20.68	0.02	55.95
10Aug2016 - 02:43:00	20.82	0.1	58.22	20.68	0.02	55.54
10Aug2016 - 02:44:00	20.82	0.1	60.82	20.67	0.02	55.18
10Aug2016 - 02:45:00	20.82	0.1	66.99	20.67	0.02	54.79
10Aug2016 - 02:46:00	20.82	0.1	74.83	20.67	0.02	55.29
10Aug2016 - 02:47:00	20.82	0.1	80.55	20.67	0.02	55.36
10Aug2016 - 02:48:00	20.82	0.1	82.98	20.67	0.02	54.41
10Aug2016 - 02:49:00	20.82	0.1	87.93	20.67	0.02	53.99
10Aug2016 - 02:50:00	20.82	0.1	94.65	20.67	0.02	54.24
10Aug2016 - 02:51:00	20.82	0.1	99.57	20.67	0.02	54.03
10Aug2016 - 02:52:00	20.82	0.1	100.4	20.67	0.02	54.26
10Aug2016 - 02:53:00	20.83	0.1	95.5	20.67	0.02	52.14
10Aug2016 - 02:54:00	20.82	0.1	99.07	20.67	0.02	51.82
10Aug2016 - 02:55:00	20.82	0.1	110.18	20.67	0.02	51.98
10Aug2016 - 02:56:00	20.82	0.1	123.3	20.66	0.02	52.92
10Aug2016 - 02:57:00	20.82	0.1	132.25	20.66	0.02	52.41
10Aug2016 - 02:58:00	20.83	0.1	135.62	20.66	0.02	51.21
10Aug2016 - 02:59:00	20.83	0.1	143.47	20.67	0.02	51.28
10Aug2016 - 03:00:00	20.83	0.1	151.89	20.67	0.02	51.55
10Aug2016 - 03:01:00	20.83	0.1	152.24	20.67	0.02	51.22
10Aug2016 - 03:02:00	20.84	0.1	136.1	20.67	0.02	48.25
10Aug2016 - 03:03:00	20.9	0.1	132.77	20.72	0.02	40.88
10Aug2016 - 03:04:00	20.92	0.1	143.43	20.76	0.02	39.85
10Aug2016 - 03:05:00	20.93	0.1	144.68	20.77	0.02	39.4
10Aug2016 - 03:06:00	20.93	0.1	104.06	20.77	0.02	38.93
10Aug2016 - 03:07:00	20.93	0.1	3.01	20.77	0.02	41.32
10Aug2016 - 03:08:00	20.92	0.1	3.41	20.79	0.02	42.29
10Aug2016 - 03:09:00	20.88	0.1	3.93	20.75	0.02	44.52
10Aug2016 - 03:10:00	20.85	0.1	3.62	20.72	0.02	45.45
10Aug2016 - 03:11:00	20.84	0.1	23.54	20.71	0.02	46.94
10Aug2016 - 03:12:00	20.66	0.1	165.38	20.57	0.02	62.77
10Aug2016 - 03:13:00	20.8	0.1	163.52	20.61	0.02	46.28
10Aug2016 - 03:14:00	20.84	0.1	169.33	20.68	0.02	45.08
10Aug2016 - 03:15:00	20.84	0.1	168.66	20.68	0.02	44.41
10Aug2016 - 03:16:00	20.84	0.1	166.57	20.68	0.02	43.68
10Aug2016 - 03:17:00	20.84	0.1	155.92	20.68	0.02	40.75
10Aug2016 - 03:18:00	20.83	0.1	153.58	20.68	0.02	39.89
10Aug2016 - 03:19:00	20.83	0.1	154.06	20.68	0.02	39.77
10Aug2016 - 03:20:00	20.83	0.1	172.05	20.68	0.02	39.8
10Aug2016 - 03:21:00	20.85	0.1	31.7	20.69	0.02	40.06
10Aug2016 - 03:22:00	20.88	0.1	11.72	20.74	0.02	43.64
10Aug2016 - 03:23:00	20.77	0.1	12.08	20.65	0.02	51.25
10Aug2016 - 03:24:00	20.74	0.1	12.97	20.6	0.02	52.12
10Aug2016 - 03:25:00	20.74	0.1	14.05	20.6	0.02	51.56
10Aug2016 - 03:26:00	20.64	0.1	143.07	20.55	0.02	67.35
10Aug2016 - 03:27:00	20.62	0.1	194.73	20.43	0.02	48.5
10Aug2016 - 03:28:00	20.73	0.1	200.54	20.59	0.02	48.4
10Aug2016 - 03:29:00	20.73	0.1	230.8	20.57	0.02	47.97
10Aug2016 - 03:30:00	20.75	0.1	89.8	20.57	0.02	45.64
10Aug2016 - 03:31:00	20.87	0.1	17.64	20.69	0.02	42.77
10Aug2016 - 03:32:00	20.79	0.1	18.78	20.67	0.02	51.34
10Aug2016 - 03:33:00	20.74	0.1	19.14	20.6	0.02	52.9
10Aug2016 - 03:34:00	20.74	0.1	19.86	20.6	0.02	51.47
10Aug2016 - 03:35:00	20.68	0.1	149.71	20.6	0.02	65.33
10Aug2016 - 03:36:00	20.57	0.1	290.05	20.41	0.02	47.42
10Aug2016 - 03:37:00	20.74	0.1	299.65	20.58	0.02	46.36
10Aug2016 - 03:38:00	20.78	0.1	288.39	20.59	0.02	41.01
10Aug2016 - 03:39:00	20.85	0.1	293.3	20.65	0.02	38.51
10Aug2016 - 03:40:00	20.87	0.1	293.11	20.68	0.02	37.45
10Aug2016 - 03:41:00	20.88	0.1	301.67	20.7	0.02	34.58
10Aug2016 - 03:42:00	20.89	0.1	303.18	20.71	0.02	33.14
10Aug2016 - 03:43:00	20.9	0.1	311.27	20.72	0.02	32.81
10Aug2016 - 03:44:00	20.91	0.1	313.87	20.73	0.02	32.64
10Aug2016 - 03:45:00	20.92	0.1	312.26	20.73	0.02	32.4
10Aug2016 - 03:46:00	20.92	0.1	314.28	20.73	0.02	32.65
10Aug2016 - 03:47:00	20.92	0.1	309.33	20.73	0.02	32.41
10Aug2016 - 03:48:00	20.92	0.1	273.41	20.73	0.02	32.19
10Aug2016 - 03:49:00	20.92	0.1	264.65	20.74	0.02	31.44
10Aug2016 - 03:50:00	20.93	0.1	263.62	20.74	0.02	30.54
10Aug2016 - 03:51:00	20.93	0.1	285.54	20.75	0.02	30.46
10Aug2016 - 03:52:00	20.92	0.1	296.68	20.75	0.02	30.95
10Aug2016 - 03:53:00	20.92	0.1	299.36	20.75	0.02	31.13
10Aug2016 - 03:54:00	20.92	0.1	302.22	20.74	0.02	30.46
10Aug2016 - 03:55:00	20.92	0.1	301.83	20.75	0.02	29.4
10Aug2016 - 03:56:00	20.92	0.1	154.7	20.75	0.02	27.62
10Aug2016 - 03:57:00	20.92	0.1	11.31	20.77	0.02	28.51
10Aug2016 - 03:58:00	20.92	0.1	10.43	20.79	0.02	28.82
10Aug2016 - 03:59:00	20.87	0.1	10.97	20.76	0.02	29.95
10Aug2016 - 04:00:00	20.85	0.1	11.14	20.73	0.02	30.44
10Aug2016 - 04:01:00	20.82	0.1	115.42	20.72	0.02	35.84
10Aug2016 - 04:02:00	20.64	0.1	324.89	20.55	0.02	30.69
10Aug2016 - 04:03:00	20.84	0.1	60.28	20.68	0.02	23.05
10Aug2016 - 04:04:00	20.91	0.1	22.24	20.77	0.02	22.65
10Aug2016 - 04:05:00	20.85	0.1	24.78	20.76	0.02	25.81

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 04:06:00	20.8	0.1	24.32	20.68	0.02	25.33
10Aug2016 - 04:07:00	20.82	0.1	24.87	20.71	0.02	24.54
10Aug2016 - 04:08:00	20.83	0.1	25.1	20.72	0.02	24.23
10Aug2016 - 04:09:00	20.82	0.1	106.15	20.72	0.02	24.4
10Aug2016 - 04:10:00	20.72	0.1	302.4	20.64	0.02	23.82
10Aug2016 - 04:11:00	20.82	0.1	291.99	20.68	0.02	20.61
10Aug2016 - 04:12:00	20.82	0.1	288.96	20.68	0.02	20.5
10Aug2016 - 04:13:00	20.83	0.1	294.63	20.68	0.02	21.15
10Aug2016 - 04:14:00	20.84	0.1	326.76	20.67	0.02	22.13
10Aug2016 - 04:15:00	20.84	0.1	337.61	20.68	0.02	21.74
10Aug2016 - 04:16:00	20.86	0.1	338.81	20.69	0.02	21.48
10Aug2016 - 04:17:00	20.88	0.1	339.28	20.7	0.02	21.99
10Aug2016 - 04:18:00	20.89	0.1	339.68	20.71	0.02	22.48
10Aug2016 - 04:19:00	20.89	0.1	341.01	20.72	0.02	22.5
10Aug2016 - 04:20:00	20.91	0.1	338.78	20.73	0.02	22.06
10Aug2016 - 04:21:00	20.91	0.1	339.43	20.74	0.02	22.26
10Aug2016 - 04:22:00	20.91	0.1	341.32	20.74	0.02	23.25
10Aug2016 - 04:23:00	20.92	0.1	340.91	20.73	0.02	23.28
10Aug2016 - 04:24:00	20.92	0.1	339.05	20.73	0.02	23.54
10Aug2016 - 04:25:00	20.92	0.1	339	20.73	0.02	23.25
10Aug2016 - 04:26:00	20.92	0.1	339.09	20.73	0.02	23.22
10Aug2016 - 04:27:00	20.92	0.1	338.05	20.73	0.02	23.27
10Aug2016 - 04:28:00	20.92	0.1	334.77	20.74	0.02	22.63
10Aug2016 - 04:29:00	20.92	0.1	325.54	20.74	0.02	21.43
10Aug2016 - 04:30:00	20.92	0.1	322.9	20.75	0.02	20.24
10Aug2016 - 04:31:00	20.92	0.1	317.77	20.75	0.02	20.09
10Aug2016 - 04:32:00	20.92	0.1	314.57	20.75	0.02	19.72
10Aug2016 - 04:33:00	20.92	0.1	309.54	20.75	0.02	18.22
10Aug2016 - 04:34:00	20.92	0.1	305.39	20.76	0.02	17.84
10Aug2016 - 04:35:00	20.92	0.1	285.6	20.76	0.02	17.58
10Aug2016 - 04:36:00	20.92	0.1	266.4	20.76	0.02	16.55
10Aug2016 - 04:37:00	20.92	0.1	265.97	20.77	0.02	16.32
10Aug2016 - 04:38:00	20.93	0.1	299.03	20.77	0.02	16.41
10Aug2016 - 04:39:00	20.92	0.1	150.59	20.77	0.02	16.43
10Aug2016 - 04:40:00	20.93	0.1	10.36	20.78	0.02	16.43
10Aug2016 - 04:41:00	20.92	0.1	11.74	20.81	0.02	16.65
10Aug2016 - 04:42:00	20.92	0.1	11.24	20.81	0.02	16.2
10Aug2016 - 04:43:00	20.92	0.1	11.58	20.82	0.02	16.05
10Aug2016 - 04:44:00	20.93	0.1	11.45	20.83	0.02	16.15
10Aug2016 - 04:45:00	20.93	0.1	10.89	20.83	0.02	16.88
10Aug2016 - 04:46:00	20.92	0.1	68.03	20.83	0.02	16.18
10Aug2016 - 04:47:00	20.91	0.1	137.13	20.82	0.02	16.03
10Aug2016 - 04:48:00	20.93	0.1	20.66	20.82	0.02	16.1
10Aug2016 - 04:49:00	20.93	0.1	18.28	20.83	0.02	16.1
10Aug2016 - 04:50:00	20.92	0.1	18.53	20.83	0.02	16.29
10Aug2016 - 04:51:00	20.92	0.1	18.77	20.83	0.02	16.58
10Aug2016 - 04:52:00	20.92	0.1	130.46	20.83	0.02	16.62
10Aug2016 - 04:53:00	20.91	0.1	268.82	20.82	0.02	15.32
10Aug2016 - 04:54:00	20.91	0.1	265.26	20.8	0.02	15.84
10Aug2016 - 04:55:00	20.92	0.1	273.83	20.79	0.02	16.31
10Aug2016 - 04:56:00	20.92	0.1	297.65	20.77	0.02	16.79
10Aug2016 - 04:57:00	20.91	0.1	299.22	20.77	0.02	17.77
10Aug2016 - 04:58:00	20.92	0.1	300.13	20.76	0.02	18.59
10Aug2016 - 04:59:00	20.91	0.1	299.65	20.75	0.02	18.76
10Aug2016 - 05:00:00	20.92	0.1	299.32	20.75	0.02	19.92
10Aug2016 - 05:01:00	20.92	0.1	296.32	20.75	0.02	20.42
10Aug2016 - 05:02:00	20.92	0.1	294.6	20.75	0.02	21.19
10Aug2016 - 05:03:00	20.92	0.1	294.1	20.75	0.02	22.47
10Aug2016 - 05:04:00	20.92	0.1	293.54	20.74	0.02	23.24
10Aug2016 - 05:05:00	20.93	0.1	291.36	20.74	0.02	23.81
10Aug2016 - 05:06:00	20.92	0.1	290	20.75	0.02	23.89
10Aug2016 - 05:07:00	20.92	0.1	287.64	20.74	0.02	24.5
10Aug2016 - 05:08:00	20.92	0.1	285.47	20.74	0.02	24.45
10Aug2016 - 05:09:00	20.92	0.1	283.08	20.75	0.02	24.34
10Aug2016 - 05:10:00	20.92	0.1	277.95	20.74	0.02	23.46
10Aug2016 - 05:11:00	20.92	0.1	268.47	20.75	0.02	23.43
10Aug2016 - 05:12:00	20.92	0.1	262.24	20.75	0.02	23.25
10Aug2016 - 05:13:00	20.93	0.1	259.17	20.75	0.02	23.48
10Aug2016 - 05:14:00	20.93	0.1	259.07	20.76	0.02	22.43
10Aug2016 - 05:15:00	20.93	0.1	254.79	20.76	0.02	22.47
10Aug2016 - 05:16:00	20.93	0.1	255.26	20.76	0.02	21.63
10Aug2016 - 05:17:00	20.92	0.1	253.66	20.76	0.02	20.4
10Aug2016 - 05:18:00	20.92	0.1	247.57	20.77	0.02	19.84
10Aug2016 - 05:19:00	20.92	0.1	230.51	20.77	0.02	19.04
10Aug2016 - 05:20:00	20.93	0.1	-1.11	20.77	0.02	19.04
10Aug2016 - 05:21:00	20.93	0.1	-1.94	20.8	0.02	19.45
10Aug2016 - 05:22:00	20.94	0.1	10.72	20.82	0.02	20.19
10Aug2016 - 05:23:00	20.93	0.1	8.65	20.81	0.02	20.69
10Aug2016 - 05:24:00	20.92	0.1	8.72	20.82	0.02	20.88
10Aug2016 - 05:25:00	20.92	0.1	8.89	20.82	0.02	21.09
10Aug2016 - 05:26:00	20.93	0.1	8.12	20.82	0.02	20.02
10Aug2016 - 05:27:00	20.92	0.1	206.35	20.83	0.02	18.76
10Aug2016 - 05:28:00	20.92	0.1	246.98	20.81	0.02	17.73
10Aug2016 - 05:29:00	20.92	0.1	239.33	20.8	0.02	17.64
10Aug2016 - 05:30:00	20.92	0.1	28.87	20.79	0.02	18.85
10Aug2016 - 05:31:00	20.93	0.1	19.12	20.8	0.02	19.3
10Aug2016 - 05:32:00	20.93	0.1	18.89	20.82	0.02	19.27

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 05:33:00	20.92	0.1	18.88	20.82	0.02	20.1
10Aug2016 - 05:34:00	20.92	0.1	19.61	20.82	0.02	20.64
10Aug2016 - 05:35:00	20.92	0.1	211.26	20.82	0.02	20.15
10Aug2016 - 05:36:00	20.92	0.1	250.91	20.81	0.02	19.41
10Aug2016 - 05:37:00	20.92	0.1	242.95	20.79	0.02	20.11
10Aug2016 - 05:38:00	20.92	0.1	241.14	20.77	0.02	21.46
10Aug2016 - 05:39:00	20.92	0.1	238.95	20.77	0.02	22.66
10Aug2016 - 05:40:00	20.92	0.1	238.24	20.77	0.02	22.98
10Aug2016 - 05:41:00	20.92	0.1	236.36	20.77	0.02	23.33
10Aug2016 - 05:42:00	20.92	0.1	233.77	20.77	0.02	23.29
10Aug2016 - 05:43:00	20.93	0.1	233.46	20.76	0.02	24.75
10Aug2016 - 05:44:00	20.93	0.1	218.09	20.76	0.02	25.22
10Aug2016 - 05:45:00	20.93	0.1	200.77	20.76	0.02	24.69
10Aug2016 - 05:46:00	20.92	0.1	199.22	20.77	0.02	25.14
10Aug2016 - 05:47:00	20.93	0.1	219.92	20.77	0.02	25.72
10Aug2016 - 05:48:00	20.93	0.1	221.67	20.77	0.02	26.65
10Aug2016 - 05:49:00	20.93	0.1	221.93	20.76	0.02	28.2
10Aug2016 - 05:50:00	20.92	0.1	221.29	20.76	0.02	29.08
10Aug2016 - 05:51:00	20.92	0.1	215.91	20.75	0.02	29.3
10Aug2016 - 05:52:00	20.92	0.1	213.66	20.76	0.02	29.22
10Aug2016 - 05:53:00	20.93	0.1	212.06	20.77	0.02	29.24
10Aug2016 - 05:54:00	20.93	0.1	195.87	20.76	0.02	29.42
10Aug2016 - 05:55:00	20.93	0.1	182.51	20.76	0.02	29.22
10Aug2016 - 05:56:00	20.93	0.1	190.97	20.77	0.02	29.14
10Aug2016 - 05:57:00	20.92	0.1	206	20.77	0.02	28.4
10Aug2016 - 05:58:00	20.93	0.1	36.65	20.77	0.02	28.36
10Aug2016 - 05:59:00	20.93	0.1	-2.96	20.79	0.02	28.75
10Aug2016 - 06:00:00	20.93	0.1	-2.96	20.8	0.02	28.28
10Aug2016 - 06:01:00	20.93	0.1	-2.83	20.81	0.02	27.99
10Aug2016 - 06:02:00	20.93	0.1	-3.01	20.81	0.02	27.68
10Aug2016 - 06:03:00	20.93	0.1	131.84	20.81	0.02	26.9
10Aug2016 - 06:04:00	20.92	0.1	90.7	20.8	0.02	26.36
10Aug2016 - 06:05:00	20.93	0.1	4.62	20.8	0.02	26.83
10Aug2016 - 06:06:00	20.93	0.1	4.8	20.81	0.02	26.18
10Aug2016 - 06:07:00	20.92	0.1	5.07	20.81	0.02	25.96
10Aug2016 - 06:08:00	20.92	0.1	4.82	20.81	0.02	26.15
10Aug2016 - 06:09:00	20.92	0.1	68.78	20.82	0.02	26.06
10Aug2016 - 06:10:00	20.92	0.1	170.26	20.81	0.02	25.14
10Aug2016 - 06:11:00	20.92	0.1	168.29	20.8	0.02	25.29
10Aug2016 - 06:12:00	20.92	0.1	107.56	20.79	0.02	25.77
10Aug2016 - 06:13:00	20.93	0.1	11.01	20.79	0.02	28.37
10Aug2016 - 06:14:00	20.93	0.1	10.85	20.8	0.02	27.01
10Aug2016 - 06:15:00	20.93	0.1	10.92	20.81	0.02	27.66
10Aug2016 - 06:16:00	20.93	0.1	10.28	20.81	0.02	28.42
10Aug2016 - 06:17:00	20.93	0.1	44.11	20.81	0.02	30.64
10Aug2016 - 06:18:00	20.93	0.1	172.21	20.8	0.02	29.43
10Aug2016 - 06:19:00	20.92	0.1	159.83	20.79	0.02	30.51
10Aug2016 - 06:20:00	20.92	0.1	160.19	20.78	0.02	32.17
10Aug2016 - 06:21:00	20.93	0.1	162.67	20.77	0.02	35.26
10Aug2016 - 06:22:00	20.93	0.1	162.78	20.77	0.02	36.29
10Aug2016 - 06:23:00	20.93	0.1	162.8	20.77	0.02	36.93
10Aug2016 - 06:24:00	20.93	0.1	160.85	20.76	0.02	36.79
10Aug2016 - 06:25:00	20.92	0.1	159.86	20.76	0.02	37.33
10Aug2016 - 06:26:00	20.92	0.1	157.91	20.77	0.02	36.99
10Aug2016 - 06:27:00	20.92	0.1	172.2	20.76	0.02	37.53
10Aug2016 - 06:28:00	20.92	0.1	175.9	20.76	0.02	38.26
10Aug2016 - 06:29:00	20.92	0.1	175.13	20.76	0.02	38.8
10Aug2016 - 06:30:00	20.92	0.1	174.78	20.76	0.02	38.89
10Aug2016 - 06:31:00	20.93	0.1	170.89	20.76	0.02	39.37
10Aug2016 - 06:32:00	20.93	0.1	166.63	20.76	0.02	39.73
10Aug2016 - 06:33:00	20.92	0.1	161.49	20.75	0.02	39.9
10Aug2016 - 06:34:00	20.92	0.1	159.47	20.76	0.02	39.13
10Aug2016 - 06:35:00	20.92	0.1	158.25	20.76	0.02	37.97
10Aug2016 - 06:36:00	20.92	0.1	70.1	20.76	0.02	38.61
10Aug2016 - 06:37:00	20.93	0.1	-3.1	20.77	0.02	40.54
10Aug2016 - 06:38:00	20.92	0.1	-2.92	20.78	0.02	40.68
10Aug2016 - 06:39:00	20.93	0.1	-3.34	20.79	0.02	40.05
10Aug2016 - 06:40:00	20.93	0.1	-3.46	20.8	0.02	39.38
10Aug2016 - 06:41:00	20.93	0.1	53.96	20.8	0.02	38.91
10Aug2016 - 06:42:00	20.92	0.1	155.64	20.79	0.02	35.91
10Aug2016 - 06:43:00	20.92	0.1	149.75	20.79	0.02	35.02
10Aug2016 - 06:44:00	20.92	0.1	147.67	20.78	0.02	35.7
10Aug2016 - 06:45:00	20.92	0.1	146.08	20.78	0.02	35.32
10Aug2016 - 06:46:00	20.92	0.1	123.36	20.77	0.02	35.22
10Aug2016 - 06:47:00	20.92	0.1	3.24	20.78	0.02	39.1
10Aug2016 - 06:48:00	20.93	0.1	2.98	20.79	0.02	38.66
10Aug2016 - 06:49:00	20.93	0.1	2.7	20.79	0.02	38.86
10Aug2016 - 06:50:00	20.93	0.1	2.53	20.8	0.02	38.43
10Aug2016 - 06:51:00	20.93	0.1	8.18	20.8	0.02	37.85
10Aug2016 - 06:52:00	20.92	0.1	145.23	20.8	0.02	35.97
10Aug2016 - 06:53:00	20.92	0.1	146.85	20.8	0.02	35.3
10Aug2016 - 06:54:00	20.92	0.1	145.26	20.79	0.02	36.2
10Aug2016 - 06:55:00	20.92	0.1	41.47	20.78	0.02	39.32
10Aug2016 - 06:56:00	20.92	0.1	9.29	20.79	0.02	40.68
10Aug2016 - 06:57:00	20.93	0.1	9.7	20.79	0.02	41.26
10Aug2016 - 06:58:00	20.93	0.1	10.4	20.8	0.02	42.32
10Aug2016 - 06:59:00	20.93	0.1	9.98	20.8	0.02	43.07

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 07:00:00	20.92	0.1	103.48	20.79	0.02	42.13
10Aug2016 - 07:01:00	20.92	0.1	157.72	20.79	0.02	40.38
10Aug2016 - 07:02:00	20.92	0.1	153.33	20.78	0.02	40.83
10Aug2016 - 07:03:00	20.93	0.1	149.75	20.77	0.02	40.63
10Aug2016 - 07:04:00	20.93	0.1	148.76	20.77	0.02	40.74
10Aug2016 - 07:05:00	20.93	0.1	147.15	20.77	0.02	40.28
10Aug2016 - 07:06:00	20.93	0.1	145.22	20.77	0.02	39.83
10Aug2016 - 07:07:00	20.93	0.1	144.02	20.77	0.02	39.86
10Aug2016 - 07:08:00	20.93	0.1	142.76	20.77	0.02	39.34
10Aug2016 - 07:09:00	20.92	0.1	141.69	20.77	0.02	39
10Aug2016 - 07:10:00	20.92	0.1	140.42	20.77	0.02	39.15
10Aug2016 - 07:11:00	20.91	0.1	139.56	20.77	0.02	39.64
10Aug2016 - 07:12:00	20.91	0.1	138.62	20.77	0.02	39.84
10Aug2016 - 07:13:00	20.91	0.1	136.27	20.77	0.02	39.58
10Aug2016 - 07:14:00	20.91	0.1	100.59	20.77	0.02	40.26
10Aug2016 - 07:15:00	20.91	0.1	-0.44	20.77	0.02	43.12
10Aug2016 - 07:16:00	20.92	0.1	-1.54	20.78	0.02	42.5
10Aug2016 - 07:17:00	20.92	0.1	-2.53	20.79	0.02	42.5
10Aug2016 - 07:18:00	20.92	0.1	-3.89	20.79	0.02	42.69
10Aug2016 - 07:19:00	20.92	0.1	9.05	20.78	0.02	42.66
10Aug2016 - 07:20:00	20.92	0.1	138.9	20.79	0.02	40.3
10Aug2016 - 07:21:00	20.92	0.1	136	20.78	0.02	39.28
10Aug2016 - 07:22:00	20.92	0.1	134.25	20.78	0.02	39.37
10Aug2016 - 07:23:00	20.92	0.1	133	20.77	0.02	38.84
10Aug2016 - 07:24:00	20.91	0.1	131.47	20.77	0.02	37.18
10Aug2016 - 07:25:00	20.91	0.1	130.2	20.77	0.02	37.08
10Aug2016 - 07:26:00	20.9	0.1	128.58	20.77	0.02	36.17
10Aug2016 - 07:26:55	20.9	0.1	127.39	20.77	0.02	36.69
Average	20.9	0.1	41.98	20.77	0.02	36.76

<u>Cylinder Gas</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
Zero ID						
Zero Expiration						
Low ID			CC14721			CC477487
Low Expiration			7/28/2023			1/22/2024
Low Concentration			1504			14.74
Mid ID	CC156934	CC156934	CC111599	CC156934	CC156934	CC103877
Mid Expiration	5/2/2024	5/2/2024	7/28/2023	4/26/2019	5/2/2024	2/9/2023
Mid Concentration	9.98	9.87	2494	9.98	9.87	24.7
High ID	CC147738	CC147738	CC201611	CC147738	CC147738	SA10032
High Expiration	12/17/2023	12/17/2023	8/4/2023	5/3/2019	12/17/2023	2/18/2023
High Concentration	22.02	17.63	4474	22.02	17.63	45.51
<u>Calibration Error</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 07:50:29						
Zero Response	0.23	0.16	1.78	0.22	0.07	0.06
Zero Error (%)	1.05	0.91	0.04	0.99	0.39	0.22
Low Response	0	0	1520.29	0	0	14.63
Low Error (%)	0	0	1.08	0	0	-0.76
Mid Response	10.18	9.85	2528.6	10.21	9.95	24.62
Mid Error (%)	0.93	-0.11	1.39	1.03	0.46	-0.33
High Response	21.99	17.58	4499.89	22.03	17.61	45.42
High Error (%)	-0.15	-0.26	0.58	0.05	-0.1	-0.21
<u>Initial Bias</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 07:50:33						
Zero Response	0.24	0.16	1.78	0.24	0.06	0.06
Zero Bias (%)	0.06	-0.02	0	0.12	-0.03	-0.74
Span Concentration	9.98	9.87	1504	9.98	9.87	14.74
Span Response	10.17	9.81	1520.29	10.17	9.9	14.63
Span Bias (%)	-0.08	-0.22	-0.3	-0.16	-0.26	0.96
<u>Final Bias & Drift</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 14:39:39						
Zero Response	0.32	0.11	1.14	0.3	0.02	-0.02
Zero Bias (%)	0.41	-0.32	-0.01	0.37	-0.25	-0.17
Zero Drift (%)	0.35	-0.3	-0.01	0.25	-0.22	0.57
Span Concentration	9.98	9.87	1504	9.98	9.87	14.74
Span Response	10.2	9.83	1534.61	10.19	9.89	14.6
Span Bias (%)	0.06	-0.16	0.32	-0.07	-0.33	-0.06
Span Drift (%)	0.14	0.06	0.62	0.09	-0.07	-1.02
<u>Results</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
Corrected Averages	20.78	-0.03	24.63	20.63	-0.02	55.13

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 07:53:00	20.9	0.1	68.1	20.78	0.02	42.96
10Aug2016 - 07:54:00	20.91	0.1	1.26	20.76	0.02	45.32
10Aug2016 - 07:55:00	20.91	0.1	0.39	20.77	0.02	44.84
10Aug2016 - 07:56:00	20.9	0.1	-0.63	20.77	0.02	44.89
10Aug2016 - 07:57:00	20.9	0.1	-1.27	20.77	0.02	45.07
10Aug2016 - 07:58:00	20.9	0.1	17.07	20.78	0.02	44.82
10Aug2016 - 07:59:00	20.9	0.1	94.29	20.77	0.02	43.13
10Aug2016 - 08:00:00	20.91	0.1	90.65	20.77	0.02	41.75
10Aug2016 - 08:01:00	20.91	0.1	100.36	20.76	0.02	42.02
10Aug2016 - 08:02:00	20.91	0.1	101.07	20.76	0.02	42.49
10Aug2016 - 08:03:00	20.91	0.1	100.68	20.76	0.02	42.13
10Aug2016 - 08:04:00	20.9	0.1	98.57	20.76	0.02	41.73
10Aug2016 - 08:05:00	20.91	0.1	98.8	20.76	0.02	42.3
10Aug2016 - 08:06:00	20.9	0.1	100.42	20.76	0.02	42.25
10Aug2016 - 08:07:00	20.91	0.1	99.56	20.76	0.02	41.89
10Aug2016 - 08:08:00	20.91	0.1	98.5	20.76	0.02	41.78
10Aug2016 - 08:09:00	20.9	0.1	89.92	20.76	0.02	41.33
10Aug2016 - 08:10:00	20.91	0.1	82.45	20.76	0.02	40.84
10Aug2016 - 08:11:00	20.9	0.1	29.73	20.76	0.02	42.74
10Aug2016 - 08:12:00	20.9	0.1	-1.21	20.77	0.02	45.79
10Aug2016 - 08:13:00	20.91	0.1	-1.36	20.77	0.02	46.12
10Aug2016 - 08:14:00	20.91	0.1	-1.44	20.77	0.02	46.66
10Aug2016 - 08:15:00	20.91	0.1	-1.67	20.77	0.02	46.74
10Aug2016 - 08:16:00	20.91	0.1	36.13	20.77	0.02	46.04
10Aug2016 - 08:17:00	20.9	0.1	89.22	20.77	0.02	43.78
10Aug2016 - 08:18:00	20.9	0.1	89.12	20.77	0.02	44.47
10Aug2016 - 08:19:00	20.9	0.1	89.82	20.76	0.02	45.03
10Aug2016 - 08:20:00	20.9	0.1	36.2	20.76	0.02	46.7
10Aug2016 - 08:21:00	20.9	0.1	4.13	20.77	0.02	48.36
10Aug2016 - 08:22:00	20.9	0.1	3.79	20.77	0.02	48.49
10Aug2016 - 08:23:00	20.9	0.1	3.52	20.76	0.02	48.73
10Aug2016 - 08:24:00	20.9	0.1	3.36	20.77	0.02	48.81
10Aug2016 - 08:25:00	20.9	0.1	46.91	20.77	0.02	47.47
10Aug2016 - 08:26:00	20.9	0.1	94.24	20.77	0.02	45.16
10Aug2016 - 08:27:00	20.9	0.1	91.04	20.77	0.02	44.86
10Aug2016 - 08:28:00	20.89	0.1	90.96	20.76	0.02	45.53
10Aug2016 - 08:29:00	20.9	0.1	90.57	20.76	0.02	46.11
10Aug2016 - 08:30:00	20.89	0.1	89.97	20.75	0.02	45.92
10Aug2016 - 08:31:00	20.89	0.1	4.03	20.76	0.02	45.78
10Aug2016 - 08:32:00	20.89	0.1	-5.28	20.75	0.02	45.57
10Aug2016 - 08:33:00	20.9	0.1	-5.47	20.75	0.02	45.48
10Aug2016 - 08:34:00	20.89	0.1	-5.28	20.75	0.02	45.17
10Aug2016 - 08:35:00	20.89	0.1	39.56	20.75	0.02	45.49
10Aug2016 - 08:36:00	20.89	0.1	85.72	20.76	0.02	46.83
10Aug2016 - 08:37:00	20.89	0.1	85.7	20.75	0.02	47.78
10Aug2016 - 08:38:00	20.89	0.1	84.93	20.74	0.02	47.79
10Aug2016 - 08:39:00	20.89	0.1	83.66	20.74	0.02	46.91
10Aug2016 - 08:40:00	20.9	0.1	82.23	20.75	0.02	46.6
10Aug2016 - 08:41:00	20.89	0.1	81.76	20.75	0.02	46.79
10Aug2016 - 08:42:00	20.9	0.1	81.11	20.75	0.02	45.73
10Aug2016 - 08:43:00	20.89	0.1	81.19	20.75	0.02	44.18
10Aug2016 - 08:44:00	20.9	0.1	80.33	20.75	0.02	45.23
10Aug2016 - 08:45:00	20.9	0.1	80.6	20.76	0.02	46.09
10Aug2016 - 08:46:00	20.9	0.1	81.52	20.75	0.02	45.64
10Aug2016 - 08:47:00	20.91	0.1	80.22	20.75	0.02	46.12
10Aug2016 - 08:48:00	20.91	0.1	78.51	20.75	0.02	46.11
10Aug2016 - 08:49:00	20.9	0.1	77.35	20.75	0.02	45.46
10Aug2016 - 08:50:00	20.9	0.1	76.52	20.75	0.02	45.24
10Aug2016 - 08:51:00	20.91	0.1	76.54	20.75	0.02	45.35
10Aug2016 - 08:52:00	20.9	0.1	76.22	20.75	0.02	45.91
10Aug2016 - 08:53:00	20.9	0.1	45.97	20.75	0.02	46.23
10Aug2016 - 08:54:00	20.91	0.1	-1.8	20.76	0.02	48.67
10Aug2016 - 08:55:00	20.9	0.1	-2.3	20.76	0.02	47.99
10Aug2016 - 08:56:00	20.9	0.1	-1.81	20.77	0.02	48.15
10Aug2016 - 08:57:00	20.9	0.1	-2.28	20.77	0.02	47.5
10Aug2016 - 08:58:00	20.9	0.1	11.94	20.78	0.02	47.49
10Aug2016 - 08:59:00	20.9	0.1	62.87	20.78	0.02	45.05
10Aug2016 - 09:00:00	20.89	0.1	61.05	20.77	0.02	44.33
10Aug2016 - 09:01:00	20.89	0.1	60.01	20.77	0.02	44.74
10Aug2016 - 09:02:00	20.9	0.1	57.46	20.77	0.02	44.14
10Aug2016 - 09:03:00	20.88	0.1	56.02	20.77	0.02	45.17
10Aug2016 - 09:04:00	20.89	0.1	54.93	20.76	0.02	45.58
10Aug2016 - 09:05:00	20.89	0.1	55.17	20.76	0.02	45.45
10Aug2016 - 09:06:00	20.89	0.1	55.79	20.76	0.02	45.15
10Aug2016 - 09:07:00	20.89	0.1	54.61	20.76	0.02	43.94
10Aug2016 - 09:08:00	20.88	0.1	56.02	20.76	0.02	44.24
10Aug2016 - 09:09:00	20.89	0.1	56.77	20.76	0.02	43.56
10Aug2016 - 09:10:00	20.88	0.1	55.7	20.76	0.02	44.56
10Aug2016 - 09:11:00	20.88	0.1	54.05	20.76	0.02	44.87
10Aug2016 - 09:12:00	20.88	0.1	53.2	20.76	0.02	45.47
10Aug2016 - 09:13:00	20.88	0.1	52.61	20.76	0.02	46.17
10Aug2016 - 09:14:00	20.88	0.1	52.35	20.76	0.02	45.92
10Aug2016 - 09:15:00	20.89	0.1	51.21	20.76	0.02	46.41
10Aug2016 - 09:16:00	20.88	0.1	54.22	20.75	0.02	46.78
10Aug2016 - 09:17:00	20.89	0.1	55.07	20.76	0.02	47.02
10Aug2016 - 09:18:00	20.88	0.1	54.06	20.76	0.02	47
10Aug2016 - 09:19:00	20.88	0.1	52.21	20.75	0.02	47.33

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 09:20:00	20.88	0.1	51.48	20.75	0.02	47.21
10Aug2016 - 09:21:00	20.89	0.1	50.66	20.76	0.02	47.54
10Aug2016 - 09:22:00	20.89	0.1	50.06	20.76	0.02	47.03
10Aug2016 - 09:23:00	20.88	0.1	49.67	20.76	0.02	47.73
10Aug2016 - 09:24:00	20.89	0.1	50.2	20.75	0.02	48.03
10Aug2016 - 09:25:00	20.88	0.1	49.2	20.75	0.02	48.66
10Aug2016 - 09:26:00	20.88	0.1	48.46	20.75	0.02	49.03
10Aug2016 - 09:27:00	20.88	0.1	48.41	20.76	0.02	48.15
10Aug2016 - 09:28:00	20.89	0.1	48.7	20.76	0.02	47.55
10Aug2016 - 09:29:00	20.89	0.1	49.42	20.76	0.02	48.17
10Aug2016 - 09:30:00	20.89	0.1	49.31	20.76	0.02	47.71
10Aug2016 - 09:31:00	20.88	0.1	49.01	20.76	0.02	46.7
10Aug2016 - 09:32:00	20.89	0.11	49.02	20.75	0.02	47.3
10Aug2016 - 09:33:00	20.89	0.1	49.16	20.76	0.02	47.18
10Aug2016 - 09:34:00	20.88	0.1	48.93	20.75	0.02	47.71
10Aug2016 - 09:35:00	20.89	0.1	49.09	20.74	0.02	48.96
10Aug2016 - 09:36:00	20.89	0.1	49.37	20.75	0.02	48.95
10Aug2016 - 09:37:00	20.89	0.1	49.7	20.74	0.02	49.43
10Aug2016 - 09:38:00	20.89	0.1	49.72	20.75	0.02	49.79
10Aug2016 - 09:39:00	20.89	0.1	49.99	20.75	0.02	49.81
10Aug2016 - 09:40:00	20.89	0.1	49.68	20.75	0.02	49.53
10Aug2016 - 09:41:00	20.89	0.1	49.67	20.75	0.02	49.29
10Aug2016 - 09:42:00	20.89	0.1	50.53	20.75	0.02	48.73
10Aug2016 - 09:43:00	20.88	0.11	50.56	20.75	0.02	48.69
10Aug2016 - 09:44:00	20.89	0.1	50.53	20.75	0.02	49.72
10Aug2016 - 09:45:00	20.89	0.1	50.23	20.75	0.02	48.61
10Aug2016 - 09:46:00	20.88	0.1	49.89	20.75	0.02	48.95
10Aug2016 - 09:47:00	20.89	0.1	49.9	20.75	0.02	50.5
10Aug2016 - 09:48:00	20.89	0.1	49.34	20.75	0.02	49.46
10Aug2016 - 09:49:00	20.88	0.1	49.03	20.75	0.02	48.73
10Aug2016 - 09:50:00	20.89	0.1	48.6	20.75	0.02	48.77
10Aug2016 - 09:51:00	20.88	0.1	48.55	20.75	0.02	48.78
10Aug2016 - 09:52:00	20.89	0.1	47.56	20.75	0.02	48.19
10Aug2016 - 09:53:00	20.88	0.1	46.89	20.75	0.02	48.9
10Aug2016 - 09:54:00	20.88	0.1	46.42	20.75	0.02	48.83
10Aug2016 - 09:55:00	20.88	0.1	45.85	20.75	0.02	48.49
10Aug2016 - 09:56:00	20.88	0.1	45.78	20.75	0.02	48.12
10Aug2016 - 09:57:00	20.88	0.1	44.82	20.74	0.02	47.14
10Aug2016 - 09:58:00	20.88	0.1	44.06	20.75	0.02	47.39
10Aug2016 - 09:59:00	20.88	0.1	44.01	20.75	0.02	47.64
10Aug2016 - 10:00:00	20.88	0.1	44.13	20.76	0.02	47.56
10Aug2016 - 10:01:00	20.89	0.1	45.07	20.75	0.02	47.88
10Aug2016 - 10:02:00	20.89	0.1	44.3	20.75	0.02	48.29
10Aug2016 - 10:03:00	20.9	0.1	43.33	20.75	0.02	48.26
10Aug2016 - 10:04:00	20.9	0.1	42.05	20.75	0.02	48.19
10Aug2016 - 10:05:00	20.9	0.1	38.44	20.75	0.02	48.12
10Aug2016 - 10:06:00	20.9	0.1	34.89	20.75	0.02	45.95
10Aug2016 - 10:07:00	20.89	0.1	34.29	20.75	0.02	45.88
10Aug2016 - 10:08:00	20.89	0.1	37.7	20.75	0.02	45.73
10Aug2016 - 10:09:00	20.89	0.1	38.76	20.76	0.02	46.79
10Aug2016 - 10:10:00	20.9	0.1	37.71	20.76	0.02	46.86
10Aug2016 - 10:11:00	20.9	0.1	36.32	20.75	0.02	48.07
10Aug2016 - 10:12:00	20.89	0.1	35.73	20.75	0.02	48.68
10Aug2016 - 10:13:00	20.89	0.1	32.04	20.75	0.02	47.35
10Aug2016 - 10:14:00	20.9	0.1	31.04	20.76	0.02	45.45
10Aug2016 - 10:15:00	20.89	0.1	29.8	20.76	0.02	45.55
10Aug2016 - 10:16:00	20.89	0.1	30.25	20.76	0.02	46.03
10Aug2016 - 10:17:00	20.9	0.1	29.82	20.76	0.02	47.32
10Aug2016 - 10:18:00	20.89	0.1	30.33	20.76	0.02	48.22
10Aug2016 - 10:19:00	20.9	0.1	31.72	20.76	0.02	47.82
10Aug2016 - 10:20:00	20.9	0.1	28.94	20.76	0.02	47.88
10Aug2016 - 10:21:00	20.9	0.1	25.25	20.76	0.02	47.22
10Aug2016 - 10:22:00	20.9	0.1	23.8	20.76	0.02	47.43
10Aug2016 - 10:23:00	20.9	0.1	23.03	20.76	0.02	46.37
10Aug2016 - 10:24:00	20.9	0.1	21.98	20.77	0.02	46.52
10Aug2016 - 10:25:00	20.89	0.1	21.57	20.76	0.02	46.97
10Aug2016 - 10:26:00	20.9	0.1	22.31	20.76	0.02	47.41
10Aug2016 - 10:27:00	20.89	0.1	22.65	20.76	0.02	47.89
10Aug2016 - 10:28:00	20.9	0.1	22.47	20.76	0.02	48.13
10Aug2016 - 10:29:00	20.9	0.1	21.71	20.76	0.02	48.54
10Aug2016 - 10:30:00	20.9	0.1	20.56	20.76	0.02	48.46
10Aug2016 - 10:31:00	20.9	0.1	20.45	20.77	0.02	49.97
10Aug2016 - 10:32:00	20.9	0.1	20.15	20.76	0.02	51.09
10Aug2016 - 10:33:00	20.9	0.1	21.56	20.76	0.02	51.78
10Aug2016 - 10:34:00	20.9	0.1	21.99	20.76	0.02	53.44
10Aug2016 - 10:35:00	20.9	0.1	22.41	20.76	0.02	54.1
10Aug2016 - 10:36:00	20.9	0.1	21.98	20.76	0.02	54.8
10Aug2016 - 10:37:00	20.9	0.1	21.45	20.77	0.02	53.97
10Aug2016 - 10:38:00	20.9	0.1	21.41	20.77	0.02	54.74
10Aug2016 - 10:39:00	20.9	0.1	21.24	20.76	0.02	54.94
10Aug2016 - 10:40:00	20.91	0.1	21.4	20.77	0.02	54.78
10Aug2016 - 10:41:00	20.9	0.1	20.73	20.77	0.02	55.47
10Aug2016 - 10:42:00	20.9	0.1	20.44	20.76	0.02	56.53
10Aug2016 - 10:43:00	20.91	0.1	20.88	20.76	0.02	56.55
10Aug2016 - 10:44:00	20.91	0.1	20.69	20.76	0.02	56.32
10Aug2016 - 10:45:00	20.91	0.1	20.82	20.76	0.02	56.55
10Aug2016 - 10:46:00	20.91	0.1	20.54	20.76	0.02	57.59

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 10:47:00	20.91	0.1	20.46	20.76	0.02	58.56
10Aug2016 - 10:48:00	20.91	0.1	20.54	20.75	0.02	57.78
10Aug2016 - 10:49:00	20.91	0.1	20.72	20.76	0.02	57.72
10Aug2016 - 10:50:00	20.91	0.1	20.47	20.76	0.02	56.34
10Aug2016 - 10:51:00	20.91	0.1	20.14	20.77	0.02	55.64
10Aug2016 - 10:52:00	20.91	0.1	19.88	20.77	0.02	56.33
10Aug2016 - 10:53:00	20.91	0.1	19.88	20.77	0.02	57.13
10Aug2016 - 10:54:00	20.9	0.1	19.92	20.76	0.02	56.49
10Aug2016 - 10:55:00	20.91	0.1	20.11	20.76	0.02	56.78
10Aug2016 - 10:56:00	20.92	0.1	19.92	20.76	0.02	56.8
10Aug2016 - 10:57:00	20.92	0.1	20.24	20.76	0.02	57.13
10Aug2016 - 10:58:00	20.92	0.1	20.35	20.76	0.02	57.01
10Aug2016 - 10:59:00	20.92	0.1	20.32	20.77	0.02	56.53
10Aug2016 - 11:00:00	20.92	0.1	20.19	20.76	0.02	57.19
10Aug2016 - 11:01:00	20.92	0.1	20.48	20.76	0.02	56.39
10Aug2016 - 11:02:00	20.92	0.1	20.82	20.77	0.02	57.09
10Aug2016 - 11:03:00	20.92	0.1	21.15	20.77	0.02	57.45
10Aug2016 - 11:04:00	20.92	0.1	20.95	20.77	0.02	57.92
10Aug2016 - 11:05:00	20.92	0.1	20.79	20.78	0.02	57.67
10Aug2016 - 11:06:00	20.91	0.1	20.61	20.78	0.02	58.32
10Aug2016 - 11:07:00	20.91	0.1	20.34	20.77	0.02	57.5
10Aug2016 - 11:08:00	20.91	0.1	18.56	20.77	0.02	57.4
10Aug2016 - 11:09:00	20.91	0.1	17.69	20.77	0.02	56.96
10Aug2016 - 11:10:00	20.9	0.1	17.44	20.77	0.02	57
10Aug2016 - 11:11:00	20.9	0.1	17.32	20.77	0.02	57.37
10Aug2016 - 11:12:00	20.9	0.1	17.21	20.76	0.02	57.03
10Aug2016 - 11:13:00	20.9	0.1	17.51	20.77	0.02	56.48
10Aug2016 - 11:14:00	20.9	0.1	16.16	20.77	0.02	56.79
10Aug2016 - 11:15:00	20.9	0.1	15.61	20.77	0.02	56.51
10Aug2016 - 11:16:00	20.9	0.1	14.39	20.77	0.02	56.23
10Aug2016 - 11:17:00	20.9	0.1	12.75	20.77	0.02	56.44
10Aug2016 - 11:18:00	20.9	0.1	12.03	20.77	0.02	56.91
10Aug2016 - 11:19:00	20.9	0.1	12.07	20.77	0.02	57.71
10Aug2016 - 11:20:00	20.9	0.1	13.22	20.77	0.02	57.05
10Aug2016 - 11:21:00	20.9	0.1	12.3	20.77	0.02	57.15
10Aug2016 - 11:22:00	20.9	0.1	11.6	20.77	0.02	57.92
10Aug2016 - 11:23:00	20.9	0.1	10.38	20.77	0.02	57.13
10Aug2016 - 11:24:00	20.9	0.1	10.46	20.76	0.02	57.26
10Aug2016 - 11:25:00	20.9	0.1	9.89	20.77	0.02	56.68
10Aug2016 - 11:26:00	20.9	0.1	9.89	20.76	0.02	57.2
10Aug2016 - 11:27:00	20.9	0.1	9.74	20.76	0.02	57.51
10Aug2016 - 11:28:00	20.9	0.1	9.64	20.76	0.02	57.4
10Aug2016 - 11:29:00	20.9	0.1	9.42	20.77	0.02	58.62
10Aug2016 - 11:30:00	20.9	0.1	9.81	20.77	0.02	58.57
10Aug2016 - 11:31:00	20.9	0.1	10.27	20.77	0.02	58.47
10Aug2016 - 11:32:00	20.9	0.1	10.7	20.77	0.02	59.55
10Aug2016 - 11:33:00	20.91	0.1	10.83	20.76	0.02	59.45
10Aug2016 - 11:34:00	20.91	0.1	10.5	20.76	0.02	59.21
10Aug2016 - 11:35:00	20.91	0.1	10.34	20.77	0.02	59.53
10Aug2016 - 11:36:00	20.92	0.1	10.42	20.76	0.02	60.42
10Aug2016 - 11:37:00	20.92	0.1	11.08	20.76	0.02	60.8
10Aug2016 - 11:38:00	20.91	0.1	10.79	20.75	0.02	60.48
10Aug2016 - 11:39:00	20.91	0.1	10.32	20.75	0.02	61.1
10Aug2016 - 11:40:00	20.91	0.1	10.06	20.76	0.02	59.79
10Aug2016 - 11:41:00	20.92	0.1	10.18	20.76	0.02	59.75
10Aug2016 - 11:42:00	20.92	0.1	9.93	20.76	0.02	59.31
10Aug2016 - 11:43:00	20.91	0.1	9.82	20.76	0.02	59.02
10Aug2016 - 11:44:00	20.92	0.1	9.81	20.76	0.02	59.74
10Aug2016 - 11:45:00	20.92	0.1	10.04	20.76	0.02	60.38
10Aug2016 - 11:46:00	20.92	0.1	10.14	20.76	0.02	60.53
10Aug2016 - 11:47:00	20.92	0.1	9.85	20.76	0.02	60.05
10Aug2016 - 11:48:00	20.91	0.1	9.58	20.76	0.02	61.34
10Aug2016 - 11:49:00	20.92	0.1	9.57	20.77	0.02	61.13
10Aug2016 - 11:50:00	20.91	0.1	9.48	20.77	0.02	61.58
10Aug2016 - 11:51:00	20.92	0.1	9.45	20.77	0.02	61.33
10Aug2016 - 11:52:00	20.92	0.1	9.24	20.77	0.02	60.99
10Aug2016 - 11:53:00	20.92	0.1	9.59	20.77	0.02	61.17
10Aug2016 - 11:54:00	20.93	0.1	9.98	20.77	0.02	61.76
10Aug2016 - 11:55:00	20.92	0.1	10.18	20.76	0.02	61.43
10Aug2016 - 11:56:00	20.92	0.1	10.35	20.76	0.02	60.31
10Aug2016 - 11:57:00	20.92	0.1	10.87	20.76	0.02	60.69
10Aug2016 - 11:58:00	20.92	0.1	10.27	20.76	0.02	60.51
10Aug2016 - 11:59:00	20.91	0.1	10.35	20.77	0.02	60.02
10Aug2016 - 12:00:00	20.92	0.1	10.93	20.77	0.02	59.08
10Aug2016 - 12:01:00	20.92	0.1	10.84	20.77	0.02	59.95
10Aug2016 - 12:02:00	20.92	0.1	10.37	20.76	0.02	60.61
10Aug2016 - 12:03:00	20.92	0.1	10.3	20.76	0.02	61.65
10Aug2016 - 12:04:00	20.92	0.1	10.44	20.76	0.02	60.28
10Aug2016 - 12:05:00	20.92	0.1	10.29	20.76	0.02	60.36
10Aug2016 - 12:06:00	20.93	0.1	10.28	20.77	0.02	60.17
10Aug2016 - 12:07:00	20.93	0.1	10.18	20.77	0.02	61.35
10Aug2016 - 12:08:00	20.93	0.1	9.62	20.77	0.02	63.13
10Aug2016 - 12:09:00	20.93	0.1	9.7	20.77	0.02	65.05
10Aug2016 - 12:10:00	20.93	0.1	9.77	20.76	0.02	65.04
10Aug2016 - 12:11:00	20.93	0.1	9.48	20.76	0.02	64.32
10Aug2016 - 12:12:00	20.93	0.1	9.69	20.76	0.02	65.41
10Aug2016 - 12:13:00	20.92	0.1	9.63	20.76	0.02	65.47

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 12:14:00	20.92	0.1	8.26	20.76	0.02	65.21
10Aug2016 - 12:15:00	20.92	0.1	8.03	20.76	0.02	64.09
10Aug2016 - 12:16:00	20.92	0.1	8.07	20.76	0.02	64.88
10Aug2016 - 12:17:00	20.92	0.1	7.61	20.76	0.02	64.77
10Aug2016 - 12:18:00	20.92	0.1	7.94	20.76	0.02	65.42
10Aug2016 - 12:19:00	20.93	0.1	7.33	20.76	0.02	65.94
10Aug2016 - 12:20:00	20.92	0.1	6.48	20.76	0.02	64.81
10Aug2016 - 12:21:00	20.92	0.1	5.73	20.76	0.02	63.76
10Aug2016 - 12:22:00	20.92	0.1	4.83	20.77	0.02	62.89
10Aug2016 - 12:23:00	20.93	0.1	3.71	20.76	0.02	63.3
10Aug2016 - 12:24:00	20.92	0.1	4.31	20.77	0.02	63.17
10Aug2016 - 12:25:00	20.93	0.1	4.66	20.77	0.02	62.58
10Aug2016 - 12:26:00	20.93	0.1	4.19	20.77	0.02	60.5
10Aug2016 - 12:27:00	20.93	0.1	3.92	20.77	0.02	60.71
10Aug2016 - 12:28:00	20.92	0.1	3.57	20.77	0.02	59.78
10Aug2016 - 12:29:00	20.93	0.1	3.35	20.76	0.02	59.8
10Aug2016 - 12:30:00	20.92	0.1	3.47	20.77	0.02	59.88
10Aug2016 - 12:31:00	20.92	0.1	3.07	20.77	0.02	59.4
10Aug2016 - 12:32:00	20.93	0.1	3.05	20.77	0.02	58.76
10Aug2016 - 12:33:00	20.93	0.1	3.29	20.77	0.02	59
10Aug2016 - 12:34:00	20.92	0.1	3.23	20.77	0.02	59.08
10Aug2016 - 12:35:00	20.92	0.1	3.59	20.77	0.02	59.78
10Aug2016 - 12:36:00	20.92	0.1	3.82	20.76	0.02	60.09
10Aug2016 - 12:37:00	20.92	0.1	3.92	20.77	0.02	59.8
10Aug2016 - 12:38:00	20.92	0.1	3.75	20.77	0.02	59.81
10Aug2016 - 12:39:00	20.92	0.1	3.37	20.77	0.02	59.69
10Aug2016 - 12:40:00	20.92	0.1	3.53	20.77	0.02	59.8
10Aug2016 - 12:41:00	20.92	0.1	3.18	20.76	0.02	59.67
10Aug2016 - 12:42:00	20.92	0.1	3.4	20.77	0.02	59.7
10Aug2016 - 12:43:00	20.93	0.1	3.8	20.77	0.02	59.66
10Aug2016 - 12:44:00	20.92	0.1	3.92	20.77	0.02	59.91
10Aug2016 - 12:45:00	20.92	0.1	3.59	20.77	0.02	60.42
10Aug2016 - 12:46:00	20.92	0.1	3.53	20.77	0.02	59.84
10Aug2016 - 12:47:00	20.92	0.1	3.7	20.77	0.02	60.23
10Aug2016 - 12:48:00	20.93	0.1	3.73	20.77	0.02	60.66
10Aug2016 - 12:49:00	20.92	0.1	3.24	20.77	0.02	60.97
10Aug2016 - 12:50:00	20.92	0.1	3.6	20.77	0.02	61.84
10Aug2016 - 12:51:00	20.92	0.1	2.86	20.77	0.02	61.73
10Aug2016 - 12:52:00	20.92	0.1	3.18	20.77	0.02	61.09
10Aug2016 - 12:53:00	20.91	0.1	3.79	20.76	0.02	60.5
10Aug2016 - 12:54:00	20.92	0.1	3.69	20.77	0.02	60.17
10Aug2016 - 12:55:00	20.91	0.1	3.79	20.76	0.02	60.49
10Aug2016 - 12:56:00	20.91	0.1	3.18	20.77	0.02	60.42
10Aug2016 - 12:57:00	20.91	0.1	3.16	20.76	0.02	60.46
10Aug2016 - 12:58:00	20.92	0.1	4.06	20.76	0.02	60.12
10Aug2016 - 12:59:00	20.92	0.1	4.06	20.76	0.02	59.13
10Aug2016 - 13:00:00	20.91	0.1	3.83	20.76	0.02	58.56
10Aug2016 - 13:01:00	20.91	0.1	3.42	20.76	0.02	57.88
10Aug2016 - 13:02:00	20.91	0.1	3.7	20.77	0.02	58.57
10Aug2016 - 13:03:00	20.92	0.1	3.59	20.77	0.02	59.27
10Aug2016 - 13:04:00	20.92	0.1	3.81	20.77	0.02	59.73
10Aug2016 - 13:05:00	20.91	0.1	3.16	20.77	0.02	59.75
10Aug2016 - 13:06:00	20.92	0.1	2.81	20.77	0.02	59.1
10Aug2016 - 13:07:00	20.93	0.1	2.4	20.77	0.02	59.17
10Aug2016 - 13:08:00	20.93	0.1	2	20.77	0.02	59.24
10Aug2016 - 13:09:00	20.93	0.1	2.15	20.77	0.02	58.69
10Aug2016 - 13:10:00	20.92	0.1	1.68	20.78	0.02	58.97
10Aug2016 - 13:11:00	20.92	0.1	1.66	20.78	0.02	59.24
10Aug2016 - 13:12:00	20.91	0.1	17.19	20.77	0.02	58.83
10Aug2016 - 13:13:00	20.91	0.1	76.34	20.77	0.02	55.92
10Aug2016 - 13:14:00	20.9	0.1	34.97	20.77	0.02	56.76
10Aug2016 - 13:15:00	20.91	0.1	29.96	20.76	0.02	58.55
10Aug2016 - 13:16:00	20.91	0.1	28.5	20.76	0.02	59.02
10Aug2016 - 13:17:00	20.91	0.1	19.35	20.76	0.02	57.88
10Aug2016 - 13:18:00	20.91	0.1	21.5	20.76	0.02	57.95
10Aug2016 - 13:19:00	20.91	0.1	17.56	20.76	0.02	56.8
10Aug2016 - 13:20:00	20.91	0.1	11.4	20.76	0.02	55.68
10Aug2016 - 13:21:00	20.9	0.1	10.52	20.76	0.02	55.7
10Aug2016 - 13:22:00	20.9	0.1	9.46	20.76	0.02	56.03
10Aug2016 - 13:23:00	20.91	0.1	7.96	20.76	0.02	57.33
10Aug2016 - 13:24:00	20.9	0.1	11.28	20.79	0.02	55.06
10Aug2016 - 13:25:00	20.9	0.1	15.88	20.77	0.02	58.5
10Aug2016 - 13:26:00	20.9	0.1	13.09	20.77	0.02	58.46
10Aug2016 - 13:27:00	20.9	0.1	9.09	20.77	0.02	56.96
10Aug2016 - 13:28:00	20.9	0.1	7.45	20.76	0.02	57.23
10Aug2016 - 13:29:00	20.9	0.1	4.79	20.76	0.02	56.72
10Aug2016 - 13:30:00	20.91	0.1	3.86	20.76	0.02	57.74
10Aug2016 - 13:31:00	20.91	0.1	4.04	20.76	0.02	59.48
10Aug2016 - 13:32:00	20.91	0.1	3.21	20.76	0.02	59.34
10Aug2016 - 13:33:00	20.9	0.1	2.83	20.76	0.02	58.85
10Aug2016 - 13:34:00	20.9	0.1	2.52	20.77	0.02	58.05
10Aug2016 - 13:35:00	20.9	0.1	2.29	20.77	0.02	57.26
10Aug2016 - 13:36:00	20.9	0.1	2.26	20.76	0.02	57.31
10Aug2016 - 13:37:00	20.9	0.1	1.69	20.76	0.02	56.29
10Aug2016 - 13:38:00	20.91	0.1	1.9	20.77	0.02	54.56
10Aug2016 - 13:39:00	20.9	0.1	1.68	20.76	0.02	54.25
10Aug2016 - 13:40:00	20.91	0.1	1.8	20.76	0.02	54.99

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 13:41:00	20.9	0.1	1.68	20.76	0.02	55.69
10Aug2016 - 13:42:00	20.9	0.1	2.01	20.76	0.02	59.62
10Aug2016 - 13:43:00	20.9	0.1	2.34	20.77	0.02	60.89
10Aug2016 - 13:44:00	20.9	0.1	2.39	20.77	0.02	63.13
10Aug2016 - 13:45:00	20.91	0.1	2.47	20.76	0.02	62.8
10Aug2016 - 13:46:00	20.9	0.1	2.25	20.76	0.02	61.47
10Aug2016 - 13:47:00	20.91	0.1	2.56	20.76	0.02	61.46
10Aug2016 - 13:48:00	20.91	0.1	3.15	20.76	0.02	61.21
10Aug2016 - 13:49:00	20.91	0.1	3.11	20.76	0.02	62.6
10Aug2016 - 13:50:00	20.91	0.1	2.78	20.76	0.02	62.06
10Aug2016 - 13:51:00	20.91	0.1	2.67	20.76	0.02	61.23
10Aug2016 - 13:52:00	20.92	0.1	2.79	20.76	0.02	60.84
10Aug2016 - 13:53:00	20.91	0.1	2.49	20.76	0.02	59.53
10Aug2016 - 13:54:00	20.91	0.1	2.05	20.76	0.02	58.17
10Aug2016 - 13:55:00	20.91	0.1	2.04	20.76	0.02	58.03
10Aug2016 - 13:56:00	20.92	0.1	2.38	20.76	0.02	57.4
10Aug2016 - 13:57:00	20.92	0.1	2.01	20.77	0.02	57.11
10Aug2016 - 13:58:00	20.91	0.1	1.84	20.77	0.02	56.9
10Aug2016 - 13:59:00	20.91	0.1	1.47	20.76	0.02	56.05
10Aug2016 - 14:00:00	20.92	0.1	1.65	20.77	0.02	56.27
10Aug2016 - 14:01:00	20.91	0.1	1.21	20.76	0.02	56.86
10Aug2016 - 14:02:00	20.91	0.1	2.07	20.76	0.02	57.54
10Aug2016 - 14:03:00	20.91	0.1	1.97	20.76	0.02	58.18
10Aug2016 - 14:04:00	20.92	0.1	1.78	20.76	0.02	58.16
10Aug2016 - 14:05:00	20.92	0.1	2.15	20.76	0.02	57.37
10Aug2016 - 14:06:00	20.92	0.1	1.87	20.77	0.02	57.06
10Aug2016 - 14:07:00	20.92	0.1	1.55	20.77	0.02	56.95
10Aug2016 - 14:08:00	20.92	0.1	1.74	20.77	0.02	56.38
10Aug2016 - 14:09:00	20.92	0.1	1.45	20.77	0.02	56.75
10Aug2016 - 14:10:00	20.92	0.1	2.26	20.77	0.02	57.33
10Aug2016 - 14:11:00	20.93	0.1	2.12	20.77	0.02	56.91
10Aug2016 - 14:12:00	20.93	0.1	1.2	20.77	0.02	57.63
10Aug2016 - 14:13:00	20.93	0.1	1.48	20.77	0.02	57.65
10Aug2016 - 14:14:00	20.92	0.1	1.52	20.77	0.02	57.73
10Aug2016 - 14:15:00	20.93	0.1	1.32	20.77	0.02	58.14
10Aug2016 - 14:16:00	20.92	0.1	1.13	20.77	0.02	58.18
10Aug2016 - 14:17:00	20.92	0.1	0.99	20.77	0.02	57.32
10Aug2016 - 14:18:00	20.93	0.1	1.4	20.77	0.02	56.43
10Aug2016 - 14:19:00	20.92	0.1	1.49	20.77	0.02	57.84
10Aug2016 - 14:20:00	20.93	0.1	1.03	20.77	0.02	59.02
10Aug2016 - 14:21:00	20.91	0.1	1.13	20.76	0.02	64.54
10Aug2016 - 14:22:00	20.76	0.1	1.04	20.65	0.02	89.44
10Aug2016 - 14:23:00	20.63	0.1	1.07	20.49	0.02	98.94
10Aug2016 - 14:24:00	20.61	0.1	1.51	20.46	0.02	103.35
10Aug2016 - 14:25:00	20.61	0.1	1.27	20.45	0.02	104.29
10Aug2016 - 14:26:00	20.6	0.1	1.09	20.44	0.02	106.74
10Aug2016 - 14:27:00	20.61	0.1	1.39	20.44	0.02	100.56
10Aug2016 - 14:28:00	20.61	0.1	1.25	20.44	0.02	106.54
10Aug2016 - 14:29:00	20.61	0.1	0.9	20.45	0.02	104.22
10Aug2016 - 14:30:00	20.61	0.1	0.76	20.45	0.02	99.77
10Aug2016 - 14:31:00	20.64	0.1	0.26	20.47	0.02	93.6
10Aug2016 - 14:32:00	20.69	0.1	0.13	20.52	0.02	86.48
10Aug2016 - 14:32:36	20.73	0.1	-0.07	20.57	0.02	80.1
Average	20.9	0.1	24.63	20.75	0.02	55.13

<u>Cylinder Gas</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
Zero ID						
Zero Expiration						
Low ID			CC14721			CC477487
Low Expiration			7/28/2023			1/22/2024
Low Concentration			1504			14.74
Mid ID	CC156934	CC156934	CC111599	CC156934	CC156934	CC103877
Mid Expiration	5/2/2024	5/2/2024	7/28/2023	4/26/2019	5/2/2024	2/9/2023
Mid Concentration	9.98	9.87	2494	9.98	9.87	24.7
High ID	CC147738	CC147738	CC201611	CC147738	CC147738	SA10032
High Expiration	12/17/2023	12/17/2023	8/4/2023	5/3/2019	12/17/2023	2/18/2023
High Concentration	22.02	17.63	4474	22.02	17.63	45.51
<u>Calibration Error</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 07:50:29						
Zero Response	0.23	0.16	1.78	0.22	0.07	0.06
Zero Error (%)	1.05	0.91	0.04	0.99	0.39	0.22
Low Response	0	0	1520.29	0	0	14.63
Low Error (%)	0	0	1.08	0	0	-0.76
Mid Response	10.18	9.85	2528.6	10.21	9.95	24.62
Mid Error (%)	0.93	-0.11	1.39	1.03	0.46	-0.33
High Response	21.99	17.58	4499.89	22.03	17.61	45.42
High Error (%)	-0.15	-0.26	0.58	0.05	-0.1	-0.21
<u>Initial Bias</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 14:39:39						
Zero Response	0.32	0.11	1.14	0.3	0.02	-0.02
Zero Bias (%)	0.41	-0.32	-0.01	0.37	-0.25	-0.17
Span Concentration	9.98	9.87	1504	9.98	9.87	14.74
Span Response	10.2	9.83	1534.61	10.19	9.89	14.6
Span Bias (%)	0.06	-0.16	0.32	-0.07	-0.33	-0.06
<u>Final Bias & Drift</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 16:26:52						
Zero Response	0.32	0.1	1.8	0.29	0.02	0.01
Zero Bias (%)	0.39	-0.33	0	0.35	-0.27	-0.09
Zero Drift (%)	-0.02	-0.01	0.01	-0.02	-0.02	0.08
Span Concentration	9.98	9.87	1504	9.98	9.87	14.74
Span Response	10.16	9.89	1541.51	10.18	9.83	14.28
Span Bias (%)	-0.13	0.18	0.47	-0.13	-0.71	-0.77
Span Drift (%)	-0.19	0.34	0.15	-0.06	-0.38	-0.71
<u>Results</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
Corrected Averages	20.74	0	398.31	20.54	0.01	23.07

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 15:23:00	20.79	0.11	610.49	20.52	0.05	54.41
10Aug2016 - 15:24:00	20.8	0.11	626	20.53	0.05	50.82
10Aug2016 - 15:25:00	20.84	0.11	656.2	20.57	0.04	44.69
10Aug2016 - 15:26:00	20.87	0.1	657.2	20.61	0.05	40.2
10Aug2016 - 15:27:00	20.87	0.11	582.09	20.61	0.05	39.03
10Aug2016 - 15:28:00	20.87	0.11	627.28	20.63	0.03	36.73
10Aug2016 - 15:29:00	20.87	0.11	156.23	20.64	0.03	36.05
10Aug2016 - 15:30:00	20.88	0.1	0.58	20.69	0.02	37.93
10Aug2016 - 15:31:00	20.89	0.11	0.59	20.76	0.03	35.88
10Aug2016 - 15:32:00	20.89	0.1	0.56	20.77	0.02	33.03
10Aug2016 - 15:33:00	20.89	0.11	0.53	20.78	0.03	29.44
10Aug2016 - 15:34:00	20.89	0.1	333.49	20.79	0.02	26.58
10Aug2016 - 15:35:00	20.88	0.1	633.9	20.77	0.02	20.12
10Aug2016 - 15:36:00	20.88	0.11	444.08	20.7	0.02	18.43
10Aug2016 - 15:37:00	20.88	0.11	45.07	20.69	0.02	20.03
10Aug2016 - 15:38:00	20.86	0.11	47.54	20.75	0.02	20.21
10Aug2016 - 15:39:00	20.77	0.1	67.01	20.69	0.02	21.36
10Aug2016 - 15:40:00	20.66	0.1	93.75	20.61	0.02	25.59
10Aug2016 - 15:41:00	20.59	0.11	100.7	20.51	0.02	25.06
10Aug2016 - 15:42:00	20.57	0.1	99.59	20.5	0.02	24.38
10Aug2016 - 15:43:00	20.57	0.1	100.21	20.49	0.02	24.51
10Aug2016 - 15:44:00	20.57	0.11	169.31	20.49	0.02	26.07
10Aug2016 - 15:45:00	20.4	0.1	575.12	20.37	0.02	33.5
10Aug2016 - 15:46:00	20.54	0.1	636.19	20.37	0.02	21.88
10Aug2016 - 15:47:00	20.61	0.11	531.71	20.41	0.02	19.6
10Aug2016 - 15:48:00	20.65	0.1	637.07	20.44	0.03	17.92
10Aug2016 - 15:49:00	20.73	0.1	561.45	20.5	0.02	16.45
10Aug2016 - 15:50:00	20.76	0.11	585.41	20.55	0.03	16.03
10Aug2016 - 15:51:00	20.8	0.11	608.21	20.57	0.03	15.24
10Aug2016 - 15:52:00	20.87	0.1	582.09	20.63	0.02	14.69
10Aug2016 - 15:53:00	20.88	0.1	605.76	20.66	0.02	14.77
10Aug2016 - 15:54:00	20.88	0.11	576.04	20.66	0.02	14.7
10Aug2016 - 15:55:00	20.88	0.11	628.85	20.66	0.02	14.7
10Aug2016 - 15:56:00	20.88	0.1	565.75	20.66	0.02	15.48
10Aug2016 - 15:57:00	20.88	0.1	638.99	20.65	0.02	15.28
10Aug2016 - 15:58:00	20.88	0.11	467.8	20.65	0.03	15.57
10Aug2016 - 15:59:00	20.88	0.11	58.54	20.67	0.02	18.26
10Aug2016 - 16:00:00	20.88	0.1	63.45	20.73	0.02	19.42
10Aug2016 - 16:01:00	20.86	0.1	78.15	20.74	0.02	19.88
10Aug2016 - 16:02:00	20.85	0.1	121.75	20.75	0.02	21.05
10Aug2016 - 16:03:00	20.82	0.11	125.83	20.71	0.02	20.91
10Aug2016 - 16:04:00	20.84	0.1	129.11	20.72	0.02	19.61
10Aug2016 - 16:05:00	20.84	0.1	128.77	20.73	0.02	19.58
10Aug2016 - 16:06:00	20.84	0.1	141.14	20.74	0.02	19.76
10Aug2016 - 16:07:00	20.82	0.1	588.63	20.72	0.02	18.48
10Aug2016 - 16:08:00	20.82	0.1	613.7	20.68	0.02	18.73
10Aug2016 - 16:09:00	20.84	0.1	636.93	20.64	0.02	18.87
10Aug2016 - 16:10:00	20.84	0.1	566.13	20.64	0.02	20.24
10Aug2016 - 16:11:00	20.86	0.1	681.47	20.65	0.02	20.61
10Aug2016 - 16:12:00	20.86	0.1	586.3	20.66	0.02	21.7
10Aug2016 - 16:13:00	20.87	0.1	645.67	20.67	0.02	20.5
10Aug2016 - 16:14:00	20.88	0.1	636.1	20.67	0.02	19.77
10Aug2016 - 16:15:00	20.89	0.1	573.29	20.68	0.02	19.64
10Aug2016 - 16:16:00	20.89	0.1	678.41	20.68	0.03	18.76
10Aug2016 - 16:17:00	20.88	0.1	562.74	20.68	0.02	17.33
10Aug2016 - 16:18:00	20.89	0.1	666.97	20.68	0.02	14.8
10Aug2016 - 16:19:00	20.89	0.11	613.04	20.67	0.02	14.69
10Aug2016 - 16:20:00	20.89	0.1	605.08	20.67	0.02	13.51
10Aug2016 - 16:21:00	20.89	0.11	74.11	20.67	0.02	15.47
10Aug2016 - 16:22:00	20.9	0.1	70.75	20.75	0.02	16.06
Average	20.82	0.1	398.31	20.64	0.03	23.07

<u>Cylinder Gas</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
Zero ID						
Zero Expiration						
Low ID			CC14721			CC477487
Low Expiration			7/28/2023			1/22/2024
Low Concentration			1504			14.74
Mid ID	CC156934	CC156934	CC111599	CC156934	CC156934	CC103877
Mid Expiration	5/2/2024	5/2/2024	7/28/2023	4/26/2019	5/2/2024	2/9/2023
Mid Concentration	9.98	9.87	2494	9.98	9.87	24.7
High ID	CC147738	CC147738	CC201611	CC147738	CC147738	SA10032
High Expiration	12/17/2023	12/17/2023	8/4/2023	5/3/2019	12/17/2023	2/18/2023
High Concentration	22.02	17.63	4474	22.02	17.63	45.51
<u>Calibration Error</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 07:50:29						
Zero Response	0.23	0.16	1.78	0.22	0.07	0.06
Zero Error (%)	1.05	0.91	0.04	0.99	0.39	0.22
Low Response	0	0	1520.29	0	0	14.63
Low Error (%)	0	0	1.08	0	0	-0.76
Mid Response	10.18	9.85	2528.6	10.21	9.95	24.62
Mid Error (%)	0.93	-0.11	1.39	1.03	0.46	-0.33
High Response	21.99	17.58	4499.89	22.03	17.61	45.42
High Error (%)	-0.15	-0.26	0.58	0.05	-0.1	-0.21
<u>Initial Bias</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 16:26:52						
Zero Response	0.32	0.1	1.8	0.29	0.02	0.01
Zero Bias (%)	0.39	-0.33	0	0.35	-0.27	-0.09
Span Concentration	9.98	9.87	1504	9.98	9.87	14.74
Span Response	10.16	9.89	1541.51	10.18	9.83	14.28
Span Bias (%)	-0.13	0.18	0.47	-0.13	-0.71	-0.77
<u>Final Bias & Drift</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 17:59:27						
Zero Response	0.3	0.1	2.78	0.27	0.02	-0.09
Zero Bias (%)	0.33	-0.32	0.02	0.22	-0.26	-0.31
Zero Drift (%)	-0.06	0.01	0.02	-0.13	0.01	-0.22
Span Concentration	9.98	9.87	1504	9.98	9.87	14.74
Span Response	10.16	9.94	1504.73	10.14	9.96	14.19
Span Bias (%)	-0.13	0.49	-0.35	-0.28	0.03	-0.97
Span Drift (%)	0	0.31	-0.82	-0.15	0.74	-0.2
<u>Results</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
Corrected Averages	20.82	0	586.07	20.61	0	62.28

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 16:55:00	20.88	0.11	637.01	20.66	0.02	25.83
10Aug2016 - 16:56:00	20.88	0.11	610.8	20.69	0.02	43.44
10Aug2016 - 16:57:00	20.88	0.11	607.83	20.71	0.03	56.73
10Aug2016 - 16:58:00	20.88	0.11	643.61	20.72	0.02	47.01
10Aug2016 - 16:59:00	20.88	0.1	600.24	20.7	0.02	30.52
10Aug2016 - 17:00:00	20.88	0.11	601.97	20.7	0.02	23.98
10Aug2016 - 17:01:00	20.88	0.11	606.11	20.7	0.02	20.11
10Aug2016 - 17:02:00	20.88	0.11	603.91	20.69	0.02	18.75
10Aug2016 - 17:03:00	20.88	0.11	597.07	20.69	0.02	16.26
10Aug2016 - 17:04:00	20.89	0.11	611.46	20.68	0.03	15.25
10Aug2016 - 17:05:00	20.88	0.11	644.88	20.67	0.02	14.22
10Aug2016 - 17:06:00	20.88	0.11	640.9	20.66	0.03	14.38
10Aug2016 - 17:07:00	20.87	0.1	633.57	20.66	0.02	13.45
10Aug2016 - 17:08:00	20.88	0.11	626.74	20.66	0.03	13.24
10Aug2016 - 17:09:00	20.88	0.11	630	20.66	0.02	13.45
10Aug2016 - 17:10:00	20.88	0.1	617.76	20.66	0.02	14.61
10Aug2016 - 17:11:00	20.88	0.11	623.56	20.66	0.02	16.36
10Aug2016 - 17:12:00	20.88	0.11	631.87	20.67	0.03	18.96
10Aug2016 - 17:13:00	20.87	0.11	634.29	20.68	0.03	21.47
10Aug2016 - 17:14:00	20.88	0.1	637.93	20.68	0.02	23.62
10Aug2016 - 17:15:00	20.88	0.11	632.81	20.68	0.02	27.39
10Aug2016 - 17:16:00	20.88	0.1	625.87	20.69	0.02	27.97
10Aug2016 - 17:17:00	20.88	0.11	612.35	20.69	0.02	33.4
10Aug2016 - 17:18:00	20.88	0.1	628.05	20.7	0.02	63.54
10Aug2016 - 17:19:00	20.88	0.1	651.52	20.7	0.03	73.38
10Aug2016 - 17:20:00	20.88	0.11	649.8	20.7	0.03	79.32
10Aug2016 - 17:21:00	20.88	0.11	635.28	20.69	0.02	81
10Aug2016 - 17:22:00	20.88	0.1	617.35	20.69	0.02	70.96
10Aug2016 - 17:23:00	20.88	0.11	613.86	20.69	0.02	77.53
10Aug2016 - 17:24:00	20.88	0.1	607.36	20.7	0.02	84.87
10Aug2016 - 17:25:00	20.88	0.1	606.55	20.71	0.02	88.84
10Aug2016 - 17:26:00	20.88	0.1	598.91	20.71	0.02	91.25
10Aug2016 - 17:27:00	20.89	0.11	595.56	20.72	0.02	93.79
10Aug2016 - 17:28:00	20.88	0.1	584.48	20.72	0.02	95.76
10Aug2016 - 17:29:00	20.88	0.1	576.68	20.72	0.02	97.9
10Aug2016 - 17:30:00	20.89	0.1	579.67	20.72	0.02	98.3
10Aug2016 - 17:31:00	20.89	0.11	584.54	20.72	0.02	97.15
10Aug2016 - 17:32:00	20.9	0.11	570.65	20.72	0.02	97.46
10Aug2016 - 17:33:00	20.89	0.1	560.72	20.73	0.02	97.85
10Aug2016 - 17:34:00	20.89	0.1	551.91	20.73	0.02	97.13
10Aug2016 - 17:35:00	20.89	0.1	546.91	20.74	0.02	101.06
10Aug2016 - 17:36:00	20.89	0.1	550.7	20.75	0.02	107.65
10Aug2016 - 17:37:00	20.89	0.1	549.8	20.76	0.02	107.65
10Aug2016 - 17:38:00	20.88	0.1	542.04	20.76	0.02	107.65
10Aug2016 - 17:39:00	20.88	0.1	542.44	20.75	0.02	107.65
10Aug2016 - 17:40:00	20.88	0.1	540.16	20.75	0.02	107.65
10Aug2016 - 17:41:00	20.88	0.1	548.47	20.73	0.02	46.19
10Aug2016 - 17:42:00	20.88	0.1	553.12	20.68	0.02	18.78
10Aug2016 - 17:43:00	20.88	0.1	551.75	20.68	0.02	48.19
10Aug2016 - 17:44:00	20.88	0.1	552.65	20.72	0.02	88.76
10Aug2016 - 17:45:00	20.88	0.1	551.35	20.74	0.02	102.38
10Aug2016 - 17:46:00	20.88	0.1	544.16	20.76	0.02	107.65
10Aug2016 - 17:47:00	20.88	0.1	536.14	20.77	0.02	107.65
10Aug2016 - 17:48:00	20.88	0.1	523.41	20.76	0.02	107.65
10Aug2016 - 17:49:00	20.88	0.1	516.39	20.76	0.02	107.65
10Aug2016 - 17:50:00	20.77	0.1	512.83	20.66	0.02	107.65
10Aug2016 - 17:51:00	20.64	0.1	507.01	20.52	0.02	78.48
10Aug2016 - 17:52:00	20.58	0.1	500.71	20.4	0.02	23.98
10Aug2016 - 17:53:00	20.58	0.1	500.7	20.37	0.02	31.17
10Aug2016 - 17:54:00	20.58	0.1	467.85	20.39	0.02	85.01
Average	20.86	0.1	586.07	20.69	0.02	62.28

<u>Cylinder Gas</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
Zero ID						
Zero Expiration						
Low ID			CC14721			CC477487
Low Expiration			7/28/2023			1/22/2024
Low Concentration			1504			14.74
Mid ID	CC156934	CC156934	CC111599	CC156934	CC156934	CC103877
Mid Expiration	5/2/2024	5/2/2024	7/28/2023	4/26/2019	5/2/2024	2/9/2023
Mid Concentration	9.98	9.87	2494	9.98	9.87	24.7
High ID	CC147738	CC147738	CC201611	CC147738	CC147738	SA10032
High Expiration	12/17/2023	12/17/2023	8/4/2023	5/3/2019	12/17/2023	2/18/2023
High Concentration	22.02	17.63	4474	22.02	17.63	45.51
<u>Calibration Error</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 07:50:29						
Zero Response	0.23	0.16	1.78	0.22	0.07	0.06
Zero Error (%)	1.05	0.91	0.04	0.99	0.39	0.22
Low Response	0	0	1520.29	0	0	14.63
Low Error (%)	0	0	1.08	0	0	-0.76
Mid Response	10.18	9.85	2528.6	10.21	9.95	24.62
Mid Error (%)	0.93	-0.11	1.39	1.03	0.46	-0.33
High Response	21.99	17.58	4499.89	22.03	17.61	45.42
High Error (%)	-0.15	-0.26	0.58	0.05	-0.1	-0.21
<u>Initial Bias</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 17:59:27						
Zero Response	0.3	0.1	2.78	0.27	0.02	-0.09
Zero Bias (%)	0.33	-0.32	0.02	0.22	-0.26	-0.31
Span Concentration	9.98	9.87	1504	9.98	9.87	14.74
Span Response	10.16	9.94	1504.73	10.14	9.96	14.19
Span Bias (%)	-0.13	0.49	-0.35	-0.28	0.03	-0.97
<u>Final Bias & Drift</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
10Aug2016 - 19:56:26						
Zero Response	0.33	0.11	1.89	0.28	0.06	-0.06
Zero Bias (%)	0.46	-0.31	0	0.28	-0.06	-0.26
Zero Drift (%)	0.13	0.01	-0.02	0.06	0.2	0.05
Span Concentration	9.98	9.87	1504	9.98	9.87	14.74
Span Response	10.17	9.82	1489.95	10.13	9.96	14.26
Span Bias (%)	-0.05	-0.18	-0.68	-0.32	0.03	-0.8
Span Drift (%)	0.08	-0.67	-0.33	-0.04	0	0.17
<u>Results</u>	O2 (%) Inlet	CO2 (%) Inlet	THC (ppmw) Inlet	O2 (%) Outlet	CO2 (%) Outlet	THC (ppmw) Outlet
Corrected Averages	20.77	0	502.73	20.62	-0.02	52.9

<u>Log Averages</u>	O2 (%)	CO2 (%)	THC (ppmw)	O2 (%)	CO2 (%)	THC (ppmw)
	Inlet	Inlet	Inlet	Outlet	Outlet	Outlet
10Aug2016 - 18:51:00	20.73	0.1	631.85	20.48	0.04	22.96
10Aug2016 - 18:52:00	20.73	0.1	657.35	20.48	0.03	23
10Aug2016 - 18:53:00	20.77	0.1	681.22	20.5	0.04	21.2
10Aug2016 - 18:54:00	20.81	0.1	595.89	20.54	0.03	19.97
10Aug2016 - 18:55:00	20.84	0.1	696.99	20.58	0.03	16.6
10Aug2016 - 18:56:00	20.88	0.1	595.48	20.63	0.03	16.04
10Aug2016 - 18:57:00	20.89	0.1	647.8	20.66	0.02	15.57
10Aug2016 - 18:58:00	20.89	0.1	615.84	20.66	0.02	16
10Aug2016 - 18:59:00	20.89	0.1	630.4	20.67	0.02	16.95
10Aug2016 - 19:00:00	20.89	0.1	659.16	20.67	0.02	19.08
10Aug2016 - 19:01:00	20.89	0.1	575.86	20.67	0.02	19.37
10Aug2016 - 19:02:00	20.89	0.1	689.84	20.68	0.02	22.81
10Aug2016 - 19:03:00	20.89	0.1	586.28	20.68	0.02	25.65
10Aug2016 - 19:04:00	20.89	0.1	648.15	20.69	0.02	28.66
10Aug2016 - 19:05:00	20.89	0.1	652.27	20.69	0.02	45
10Aug2016 - 19:06:00	20.89	0.1	595.84	20.7	0.03	63.45
10Aug2016 - 19:07:00	20.89	0.1	386.63	20.7	0.02	83.92
10Aug2016 - 19:08:00	20.9	0.1	54.91	20.75	0.02	91.46
10Aug2016 - 19:09:00	20.85	0.1	54.99	20.8	0.02	94.35
10Aug2016 - 19:10:00	20.73	0.1	111.72	20.7	0.02	95.46
10Aug2016 - 19:11:00	20.61	0.1	112.28	20.57	0.02	95.63
10Aug2016 - 19:12:00	20.6	0.1	112.54	20.54	0.02	94.79
10Aug2016 - 19:13:00	20.59	0.1	114.05	20.53	0.02	94.27
10Aug2016 - 19:14:00	20.58	0.1	119.53	20.52	0.02	94.89
10Aug2016 - 19:15:00	20.47	0.1	554.59	20.46	0.02	96.99
10Aug2016 - 19:16:00	20.51	0.1	627.88	20.36	0.02	90.95
10Aug2016 - 19:17:00	20.6	0.1	591.1	20.43	0.02	92.67
10Aug2016 - 19:18:00	20.63	0.1	664.92	20.45	0.02	93.26
10Aug2016 - 19:19:00	20.69	0.1	668.04	20.48	0.02	94.25
10Aug2016 - 19:20:00	20.77	0.1	615.35	20.58	0.02	94.08
10Aug2016 - 19:21:00	20.8	0.1	612.27	20.62	0.02	94.97
10Aug2016 - 19:22:00	20.86	0.1	689.37	20.67	0.02	96.76
10Aug2016 - 19:23:00	20.89	0.1	625.66	20.71	0.02	96.19
10Aug2016 - 19:24:00	20.89	0.1	607.2	20.72	0.02	87
10Aug2016 - 19:25:00	20.89	0.1	682.39	20.71	0.02	48.89
10Aug2016 - 19:26:00	20.89	0.1	641.15	20.69	0.02	39.35
10Aug2016 - 19:27:00	20.89	0.1	621.15	20.69	0.02	25.06
10Aug2016 - 19:28:00	20.89	0.1	571.54	20.68	0.02	20.54
10Aug2016 - 19:29:00	20.89	0.1	437.48	20.69	0.02	19.28
10Aug2016 - 19:30:00	20.9	0.1	76.63	20.72	0.02	21.65
10Aug2016 - 19:31:00	20.88	0.1	81.99	20.78	0.02	21.94
10Aug2016 - 19:32:00	20.87	0.1	146.3	20.79	0.02	22.15
10Aug2016 - 19:33:00	20.84	0.1	156.17	20.76	0.02	22.31
10Aug2016 - 19:34:00	20.84	0.1	158.64	20.75	0.02	22.35
10Aug2016 - 19:35:00	20.85	0.1	159.46	20.76	0.02	23.01
10Aug2016 - 19:36:00	20.85	0.1	160.45	20.76	0.02	24.85
10Aug2016 - 19:37:00	20.84	0.1	524	20.76	0.02	28.82
10Aug2016 - 19:38:00	20.82	0.1	603.49	20.7	0.02	47.39
10Aug2016 - 19:39:00	20.84	0.1	641.83	20.68	0.02	80.37
10Aug2016 - 19:40:00	20.84	0.1	641.72	20.67	0.02	83.13
10Aug2016 - 19:41:00	20.85	0.1	662.87	20.67	0.02	81.61
10Aug2016 - 19:42:00	20.87	0.1	642.96	20.68	0.02	83.36
10Aug2016 - 19:43:00	20.87	0.1	611.03	20.7	0.02	82.3
10Aug2016 - 19:44:00	20.89	0.1	614.73	20.71	0.02	80.27
10Aug2016 - 19:45:00	20.89	0.1	691.74	20.71	0.02	62.49
10Aug2016 - 19:46:00	20.89	0.1	593.48	20.7	0.02	49.81
10Aug2016 - 19:47:00	20.89	0.1	606.07	20.71	0.02	37.8
10Aug2016 - 19:48:00	20.89	0.1	635.24	20.7	0.02	26.57
10Aug2016 - 19:49:00	20.89	0.1	663.19	20.69	0.02	22.13
10Aug2016 - 19:50:00	20.89	0.1	654.89	20.69	0.02	22.1
Average	20.82	0.1	502.73	20.65	0.02	52.9

APPENDIX E

METHOD 18 DETECTION LIMIT DETERMINATION AND CALIBRATION CERTIFICATES

SRI 8610C GC-FID Minimum Detection Limit Determination

Covidien L.P. - August 9, 2016

Gas Standard	Low Standard Response (ppm)							Average	Standard Deviation	MDL (ppm)
	1	2	3	4	5	6	7			
ethylene oxide (1.00 ppm certified concentration)	0.9243	0.8931	0.9023	0.9301	0.9132	0.8892	0.9033	0.9079	0.015	0.048

1. PQL = 1/2 of the low standard concentration

2. MDL (ppm) = STDEV x 3.143

STDEV = standard deviation of the response for 7 injections of the low standard

3.143 = Student T-value for n-1 degrees of freedom at a 99% confidence



Praxair Distribution, Inc.
37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

06/02/2015

PRAXAIR DISTRIBUTION MIDATLANTIC
PO BOX 1377
DES MOINES, IA 503050000
Attention: JIM BAIRD X215

Work Order No. **31275208**
Customer Reference No.

Product Lot/Batch No. **Z582 5141 3U**
Product Part No. **NI EO1MC-A3**

CERTIFICATE OF ANALYSIS

Certified Standard

<u>Component</u>	<u>Requested Concentration</u>	<u>Certified Concentration</u>	<u>Analytical Principle</u>	<u>Analytical Accuracy</u>
Ethylene oxide	1 ppm	1.00 ppm	D	+/- 5 %
Nitrogen	balance	balance		

Analytical Instruments: **Hewlett Packard 6890**
 Cylinder Style: **A3**
 Cylinder Pressure @70F: **2000 psig**
 Cylinder Volume: **28.0 ft3**
 Valve Outlet Connection: **CGA-350**
 Cylinder No(s). **EA0011747**

Filling Method: **Gravimetric**
 Date of Fill: **05/21/2015**
 Expiration Date: **05/21/2017**

Analyst: James Dobson - Chemist

QA Reviewer: Oscar Del Bosque - Lab Manager

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are either prepared by weights traceable to the National Institute of Standards and Technology (NIST), Measurement Canada, or by using NIST Standard Reference Materials where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted.

Key to Analytical Techniques:					
A	Flame Ionization with Methanizer	B	Gas Chromatography with Discharge Ionization Detector	C	Gas Chromatography with Electrolytic Conductivity Detector
E	Gas Chromatography with Flame Photometric Detector	F	Gas Chromatography with Helium Ionization Detector	G	Gas Chromatography with Methanizer Carbonizer
I	Gas Chromatography with Reduction Gas Analyzer	J	Gas Chromatography with Thermal Conductivity Detector	K	Binary Gas Analyzer with Thermal Conductivity Detector
M	Mass Spectrometry - MS or GC/MS	N	By Difference of Typical Impurities	O	Paramagnetic
Q	Total Hydrocarbon Analyzer	R	Wet Chemical	S	Detector Tube
U	Gas Chromatography with Chemiluminescence Detector	V	Electrochemical	W	Electron Capture Detector
Y	Chemiluminescence	Z	N/A	X	Certified Gravimetrically

IMPORTANT

The information contained herein has been prepared at your request by personnel within Praxair Distribution, Inc.. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.



Praxair Distribution, Inc.
37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

PRAIRIE DISTRIBUTION MIDATLANTIC
PO BOX 1377
DES MOINES, IA 503050000
Attention: JIM BAIRD X215

06/02/2015

Work Order No. **31275208**
Customer Reference No.

Product Lot/Batch No. **Z582 5141 3S**
Product Part No. **NI EO5MC-A3**

CERTIFICATE OF ANALYSIS *Certified Standard*

<u>Component</u>	<u>Requested Concentration</u>	<u>Certified Concentration</u>	<u>Analytical Principle</u>	<u>Analytical Accuracy</u>
Ethylene oxide	5 ppm	5.00 ppm	D	+/- 5 %
Nitrogen	balance	balance		

Analytical Instruments: **Hewlett Packard 6890**
 Cylinder Style: **A3**
 Cylinder Pressure @70F: **2000 psig**
 Cylinder Volume: **28.0 ft3**
 Valve Outlet Connection: **CGA-350**
 Cylinder No(s). **EA0011733**

Filling Method: **Gravimetric**
 Date of Fill: **05/21/2015**
 Expiration Date: **05/21/2017**

Analyst: James Dobson - Chemist

QA Reviewer: Oscar Del Bosque - Lab Manager

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are either prepared by weights traceable to the National Institute of Standards and Technology (NIST), Measurement Canada, or by using NIST Standard Reference Materials where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted.

Key to Analytical Techniques:

A	Flame Ionization with Methanizer	B	Gas Chromatography with Discharge Ionization Detector	C	Gas Chromatography with Electrolytic Conductivity Detector	D	Gas Chromatography with Flame Ionization Detector
E	Gas Chromatography with Flame Photometric Detector	F	Gas Chromatography with Helium Ionization Detector	G	Gas Chromatography with Methanizer Carbonizer	H	Gas Chromatography with Photoionization Detector
I	Gas Chromatography with Reduction Gas Analyzer	J	Gas Chromatography with Thermal Conductivity Detector	K	Binary Gas Analyzer with Thermal Conductivity Detector	L	Infrared - FTIR or NDIR
M	Mass Spectrometry - MS or GC/MS	N	By Difference of Typical Impurities	O	Paramagnetic	P	Specific Water Analyzer
Q	Total Hydrocarbon Analyzer	R	Wet Chemical	S	Detector Tube	T	Odor
U	Gas Chromatography with Chemiluminescence Detector	V	Electrochemical	W	Electron Capture Detector	X	Certified Gravimetrically
Y	Chemiluminescence	Z	N/A				

IMPORTANT

The information contained herein has been prepared at your request by personnel within Praxair Distribution, Inc.. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.



Praxair Distribution, Inc.
37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

06/02/2015

PRAXAIR DISTRIBUTION MIDATLANTIC
PO BOX 1377
DES MOINES, IA 503050000
Attention: JIM BAIRD X215

Work Order No. **31275208**
Customer Reference No.

Product Lot/Batch No. **Z582 5141 3Q**
Product Part No. **NI EO10MP-A3**

CERTIFICATE OF ANALYSIS *Primary Standard*

<u>Component</u>	<u>Requested Concentration</u>	<u>Certified Concentration</u>	<u>Analytical Principle</u>	<u>Analytical Accuracy</u>
Ethylene oxide	10 ppm	10.0 ppm	D	+/- 1 %
Nitrogen	balance	balance		

Analytical Instruments: **Hewlett Packard 6890**
 Cylinder Style: **A3**
 Cylinder Pressure @70F: **2000 psig**
 Cylinder Volume: **28.0 ft3**
 Valve Outlet Connection: **CGA-350**
 Cylinder No(s). **EA0077506**

Filling Method: **Gravimetric**
 Date of Fill: **05/21/2015**
 Expiration Date: **05/21/2017**

Analyst: **James Dobson - Chemist**

QA Reviewer: **Oscar Del Bosque - Lab Manager**

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are either prepared by weights traceable to the National Institute of Standards and Technology (NIST), Measurement Canada, or by using NIST Standard Reference Materials where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted.

Key to Analytical Techniques:

A	Flame Ionization with Methanizer	B	Gas Chromatography with Discharge Ionization Detector	C	Gas Chromatography with Electrolytic Conductivity Detector	D	Gas Chromatography with Flame Ionization Detector
E	Gas Chromatography with Flame Photometric Detector	F	Gas Chromatography with Helium Ionization Detector	G	Gas Chromatography with Methanizer Carbonizer	H	Gas Chromatography with Photoionization Detector
I	Gas Chromatography with Reduction Gas Analyzer	J	Gas Chromatography with Thermal Conductivity Detector	K	Binary Gas Analyzer with Thermal Conductivity Detector	L	Infrared - FTIR or NDIR
M	Mass Spectrometry - MS or GC/MS	N	By Difference of Typical Impurities	O	Paramagnetic	P	Specific Water Analyzer
Q	Total Hydrocarbon Analyzer	R	Wet Chemical	S	Detector Tube	T	Odor
U	Gas Chromatography with Chemiluminescence Detector	V	Electrochemical	W	Electron Capture Detector	X	Certified Gravimetrically
Y	Chemiluminescence	Z	N/A				

IMPORTANT

The information contained herein has been prepared at your request by personnel within Praxair Distribution, Inc.. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.



Praxair Distribution, Inc.
37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

06/02/2015

PRAXAIR DISTRIBUTION MIDATLANTIC
PO BOX 1377
DES MOINES, IA 503050000
Attention: JIM BAIRD X215

Work Order No. **31275208**
Customer Reference No.

Product Lot/Batch No. **Z582 5141 3P**
Product Part No. **NI EO100P-A3**

CERTIFICATE OF ANALYSIS *Primary Standard*

<u>Component</u>	<u>Requested Concentration</u>	<u>Certified Concentration</u>	<u>Analytical Principle</u>	<u>Analytical Accuracy</u>
Ethylene oxide	100 ppm	98.9 ppm	D	+/- 1 %
Nitrogen	balance	balance		

Analytical Instruments: **Hewlett Packard 6890**
 Cylinder Style: **A3**
 Cylinder Pressure @70F: **2000 psig**
 Cylinder Volume: **28.0 ft3**
 Valve Outlet Connection: **CGA-350**
 Cylinder No(s). **EA0011746**

Filling Method: **Gravimetric**
 Date of Fill: **05/21/2015**
 Expiration Date: **06/21/2017**

Analyst: **James Dobson - Chemist**

QA Reviewer: **Oscar Del Bosque - Lab Manager**

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are either prepared by weights traceable to the National Institute of Standards and Technology (NIST), Measurement Canada, or by using NIST Standard Reference Materials where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted.

Key to Analytical Techniques:

A	Flame Ionization with Methanizer	B	Gas Chromatography with Discharge Ionization Detector	C	Gas Chromatography with Electrolytic Conductivity Detector	D	Gas Chromatography with Flame Ionization Detector
E	Gas Chromatography with Flame Photometric Detector	F	Gas Chromatography with Helium Ionization Detector	G	Gas Chromatography with Methanizer Carbonizer	H	Gas Chromatography with Photoionization Detector
I	Gas Chromatography with Reduction Gas Analyzer	J	Gas Chromatography with Thermal Conductivity Detector	K	Binary Gas Analyzer with Thermal Conductivity Detector	L	Infrared - FTIR or NDIR
M	Mass Spectrometry - MS or GC/MS	N	By Difference of Typical Impurities	O	Paramagnetic	P	Specific Water Analyzer
Q	Total Hydrocarbon Analyzer	R	Wet Chemical	S	Detector Tube	T	Odor
U	Gas Chromatography with Chemiluminescence Detector	V	Electrochemical	W	Electron Capture Detector	X	Certified Gravimetrically
Y	Chemiluminescence	Z	N/A				

IMPORTANT

The information contained herein has been prepared at your request by personnel within Praxair Distribution, Inc.. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.



Praxair Distribution, Inc.
37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

06/02/2015

PRAXAIR DISTRIBUTION MIDATLANTIC
PO BOX 1377
DES MOINES, IA 503050000
Attention: JIM BAIRD X215

Work Order No. **31275208**
Customer Reference No.

Product Lot/Batch No. **Z582 5141 3T**
Product Part No. **NI EO1000C-A3**

CERTIFICATE OF ANALYSIS *Certified Standard*

<u>Component</u>	<u>Requested Concentration</u>	<u>Certified Concentration</u>	<u>Analytical Principle</u>	<u>Analytical Accuracy</u>
Ethylene oxide	1000 ppm	1000 ppm	D	+/- 2 %
Nitrogen	balance	balance		

Analytical Instruments: **Hewlett Packard 6890**
 Cylinder Style: **A3**
 Cylinder Pressure @70F: **2000 psig**
 Cylinder Volume: **28.1 ft3**
 Valve Outlet Connection: **CGA-350**
 Cylinder No(s). **FF56997**

Filling Method: **Gravimetric**
 Date of Fill: **05/21/2015**
 Expiration Date: **05/21/2017**

Analyst: James Dobson - Chemist

QA Reviewer: Oscar Del Bosque - Lab Manager

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are either prepared by weights traceable to the National Institute of Standards and Technology (NIST), Measurement Canada, or by using NIST Standard Reference Materials where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted.

Key to Analytical Techniques:

A	Flame Ionization with Methanizer	B	Gas Chromatography with Discharge Ionization Detector	C	Gas Chromatography with Electrolytic Conductivity Detector	D	Gas Chromatography with Flame Ionization Detector
E	Gas Chromatography with Flame Photometric Detector	F	Gas Chromatography with Helium Ionization Detector	G	Gas Chromatography with Methanizer Carbonizer Detector	H	Gas Chromatography with Photoionization Detector
I	Gas Chromatography with Reduction Gas Analyzer	J	Gas Chromatography with Thermal Conductivity Detector	K	Binary Gas Analyzer with Thermal Conductivity Detector	L	Infrared - FTIR or NDIR
M	Mass Spectrometry - MS or GC/MS	N	By Difference of Typical Impurities	O	Paramagnetic	P	Specific Water Analyzer
Q	Total Hydrocarbon Analyzer	R	Wet Chemical	S	Detector Tube	T	Odor
U	Gas Chromatography with Chemiluminescence Detector	V	Electrochemical	W	Electron Capture Detector	X	Certified Gravimetrically
Y	Chemiluminescence	Z	N/A				

IMPORTANT

The information contained herein has been prepared at your request by personnel within Praxair Distribution, Inc.. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.



Praxair Distribution, Inc.
37256 Highway 30
Geismar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

06/02/2015

PRAXAIR DISTRIBUTION MIDATLANTIC
PO BOX 1377
DES MOINES, IA 503050000
Attention: JIM BAIRD X215

Work Order No. **31275208**
Customer Reference No.

Product Lot/Batch No. **Z582 5141 3R**
Product Part No. **NI EO2000P-A3**

CERTIFICATE OF ANALYSIS

Primary Standard

<u>Component</u>	<u>Requested Concentration</u>	<u>Certified Concentration</u>	<u>Analytical Principle</u>	<u>Analytical Accuracy</u>
Ethylene oxide	2000 ppm	2000 ppm	D	+/- 1 %
Nitrogen	balance	balance		

Analytical Instruments: **Hewlett Packard 6890**
 Cylinder Style: **A3**
 Cylinder Pressure @70F: **2000 psig**
 Cylinder Volume: **28.0 ft3**
 Valve Outlet Connection: **CGA-350**
 Cylinder No(s). **EA0011722**

Filling Method: **Gravimetric**
 Date of Fill: **05/21/2015**
 Expiration Date: **05/21/2017**

Analyst: James Dobson - Chemist

QA Reviewer: Oscar Del Bosque - Lab Manager

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are either prepared by weights traceable to the National Institute of Standards and Technology (NIST), Measurement Canada, or by using NIST Standard Reference Materials where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted.

Key to Analytical Techniques:

A	Flame Ionization with Methanizer	B	Gas Chromatography with Discharge Ionization Detector	C	Gas Chromatography with Electrolytic Conductivity Detector	D	Gas Chromatography with Flame Ionization Detector
E	Gas Chromatography with Flame Photometric Detector	F	Gas Chromatography with Helium Ionization Detector	G	Gas Chromatography with Methanizer Carbonizer	H	Gas Chromatography with Photoionization Detector
I	Gas Chromatography with Reduction Gas Analyzer	J	Gas Chromatography with Thermal Conductivity Detector	K	Binary Gas Analyzer with Thermal Conductivity Detector	L	Infrared - FTIR or NDIR
M	Mass Spectrometry - MS or GC/MS	N	By Difference of Typical Impurities	O	Paramagnetic	P	Specific Water Analyzer
Q	Total Hydrocarbon Analyzer	R	Wet Chemical	S	Detector Tube	T	Odor
U	Gas Chromatography with Chemiluminescence Detector	V	Electrochemical	W	Electron Capture Detector	X	Certified Gravimetrically
Y	Chemiluminescence	Z	N/A				

IMPORTANT

The information contained herein has been prepared at your request by personnel within Praxair Distribution, Inc.. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.



CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E03NI80E15A0138
 Cylinder Number: CC156934
 Laboratory: ASG - Riverton - NJ
 PGVP Number: B52016
 Gas Code: CO2,O2,BALN

Reference Number: 82-124552767-1
 Cylinder Volume: 150.9 CF
 Cylinder Pressure: 2015 PSIG
 Valve Outlet: 590
 Certification Date: May 02, 2016

Expiration Date: May 02, 2024

Airgas, Inc.

600 Union Landing Road
 Cinnaminson, NJ 08077
 856-829-7878 Fax: 856-829-6576
www.airgas.com

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	10.00 %	9.874 %	G1	+/- 0.7% NIST Traceable	05/02/2016
OXYGEN	10.00 %	9.979 %	G1	+/- 0.4% NIST Traceable	05/02/2016
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061322	CC359994	11.002 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 11, 2018
NTRMplus	09060208	CC262337	9.961 % OXYGEN/NITROGEN	+/- 0.3%	Nov 08, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA 510-CO2-LDH9LRNS	NDIR	Apr 28, 2016
Horiba MPA 510-O2-7TWMJ041	Paramagnetic	Apr 28, 2016

Triad Data Available Upon Request



Approved for Release

Page 1 of 82-124552767-1

cm



CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E03NI60E15A1069
 Cylinder Number: CC147738
 Laboratory: ASG - Riverton - NJ
 PGVP Number: B52015
 Gas Code: CO2,O2,BALN

Reference Number: 82-124527781-1
 Cylinder Volume: 158.2 CF
 Cylinder Pressure: 2015 PSIG
 Valve Outlet: 590
 Certification Date: Dec 17, 2015

Expiration Date: Dec 17, 2023

Airgas, Inc.
 600 Union Landing Rd
 Cinnaminson, NJ 08077
 856-829-7878 Fax: 856-829-6576
Airgas.com

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	18.00 %	17.63 %	G1	+/- 0.7% NIST Traceable	12/17/2015
OXYGEN	22.00 %	22.02 %	G1	+/- 0.4% NIST Traceable	12/17/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060819	CC417106	24.04 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 16, 2019
NTRMplus	09061404	CC267783	22.53 % OXYGEN/NITROGEN	+/- 0.4%	Mar 08, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA 510-CO2-LDH9LRNS	NDIR	Dec 09, 2015
Horiba MPA 510-O2-7TWMJ041	Paramagnetic	Dec 04, 2015

Triad Data Available Upon Request



Approved for Release



CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E02AI99E15A52T6
 Cylinder Number: CC14721
 Laboratory: ASG - Riverton - NJ
 PGVP Number: B52015
 Gas Code: CH4,BALA

Reference Number: 82-124504022-1
 Cylinder Volume: 146.2 CF
 Cylinder Pressure: 2015 PSIG
 Valve Outlet: 590
 Certification Date: Jul 28, 2015

Expiration Date: Jul 28, 2023

Airgas, Inc.
 600 Union Landing Road
 Cinnaminson, NJ 08077
 856-829-7878 Fax: 856-829-6576
Airgas.com

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE AIR	1500 PPM Balance	1504 PPM	G1	+/- 0.7% NIST Traceable	07/28/2015

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	11061205	CC2198	985.2 PPM METHANE/AIR	+/- 0.6%	May 25, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 APW1100391 CH4	FTIR	Jul 10, 2015

Triad Data Available Upon Request



Approved for Release



CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E02AI99E15A0686
 Cylinder Number: CC111599
 Laboratory: ASG - Riverton - NJ
 PGVP Number: B52015
 Gas Code: CH4,BALA

Reference Number: 82-124504037-1
 Cylinder Volume: 146.3 CF
 Cylinder Pressure: 2015 PSIG
 Valve Outlet: 590
 Certification Date: Jul 28, 2015

Expiration Date: Jul 28, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE AIR	2500 PPM Balance	2494 PPM	G1	+/- 0.7% NIST Traceable	07/28/2015

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	14060914	CC09276	2971 PPM METHANE/AIR	+/- 0.6%	Jul 03, 2020

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 APW1100391 CH4	FTIR	Jul 10, 2015

Triad Data Available Upon Request



Approved for Release

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E02AI99E15A1807
 Cylinder Number: CC201611
 Laboratory: ASG - Riverton - NJ
 PGVP Number: B52015
 Gas Code: CH4,BALA

Reference Number: 82-124504040-1
 Cylinder Volume: 146.3 CF
 Cylinder Pressure: 2015 PSIG
 Valve Outlet: 590
 Certification Date: Aug 04, 2015

Expiration Date: Aug 04, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE AIR	4500 PPM Balance	4474 PPM	G1	+/- 0.7% NIST Traceable	08/04/2015

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	14060914	CC89276	2971 PPM METHANE/AIR	+/- 0.6%	Jul 03, 2020

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 APW1100391 CH4	FTIR	Jul 10, 2015

Triad Data Available Upon Request



Approved for Release

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E02AI99E15AC431
 Cylinder Number: CC477465
 Laboratory: ASG - Riverton - NJ
 PGVP Number: B52016
 Gas Code: CH4,BALA

Reference Number: 82-124531057-1
 Cylinder Volume: 146.2 CF
 Cylinder Pressure: 2015 PSIG
 Valve Outlet: 590
 Certification Date: Jan 22, 2016

Expiration Date: Jan 22, 2024

Airgas, Inc.

600 Union Landing Rd
 Cinnaminson, NJ 08077
 856-829-7878 Fax: 856-829-6576
Airgas.com

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE	8.500 PPM	8.325 PPM	G1	+/- 0.6% NIST Traceable	01/22/2016
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12060602	CC356075	9.91 PPM METHANE/AIR	+/- 0.4%	Nov 29, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801933 CH4	FTIR	Jan 22, 2016

Triad Data Available Upon Request



C. Mulligan

Approved for Release



CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E02AI99E15A0440
 Cylinder Number: CC477487
 Laboratory: ASG - Riverton - NJ
 PGVP Number: B52016
 Gas Code: CH4,BALA

Reference Number: 82-124531058-1
 Cylinder Volume: 146.2 CF
 Cylinder Pressure: 2015 PSIG
 Valve Outlet: 590
 Certification Date: Jan 22, 2016

Expiration Date: Jan 22, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE AIR	15.00 PPM Balance	14.74 PPM	G1	+/- 1.1% NIST Traceable	01/22/2016

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12060602	CC356075	9.91 PPM METHANE/AIR	+/- 0.4%	Nov 29, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801933 CH4	FTIR	Jan 22, 2016

Triad Data Available Upon Request



C. Molyneux

Approved for Release

DocNumber: 000011831

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS**Customer & Order Information:**

PDI WHSE DURHAM
89 COMMERCE CIR
DURHAM CT 064220

Praxair Order Number: 05352097
Customer P. O. Number: CANOMARA LLC.
Customer Reference Number:

Fill Date: 2/5/2015
Part Number: AI ME25ME-AS
Lot Number: 304125036504
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	2/9/2023	NIST Traceable
Cylinder Number:	CC103877	Analytical Uncertainty:
24.70	ppm METHANE	± 0.9 %
Balance	AIR	

Certification Information: Certification Date: 2/9/2015 Term: 96 Months Expiration Date: 2/9/2023

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1 . Component: **METHANE**

Requested Concentration: 25 ppm
Certified Concentration: 24.70 ppm
Instrument Used: MKS 2031
Analytical Method: FTIR
Last Multipoint Calibration: 2/9/2015

First Analysis Data:		Date:	2/9/2015
Z:	-3.78	R:	97.5
R:	97.56	Z:	-3.74
Z:	-3.73	C:	21.65
UOM: PPM		Mean Test Assay:	24.7 PPM

Analyzed by:

Jeff Gosner

Reference Standard Type: GMIS
Ref. Std. Cylinder #: ND27846
Ref. Std. Conc: 98.48 PPM
Ref. Std. Traceable to SRM #: 2751
SRM Sample #: 212-C-52
SRM Cylinder #:

Second Analysis Data:		Date:	
Z:	0	R:	0
R:	0	Z:	0
Z:	0	C:	0
UOM: PPM		Mean Test Assay:	0 PPM

Certified by:

Judith Imperial

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

Pitot Tube Inspection Form

40 CFR 60, Appendix A, Method 2

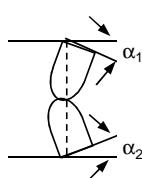
Pitot Number: P4-1
Inspected By: Evan Bali
Inspection Date: 02/04/2016

Reviewed By: Jim Canora

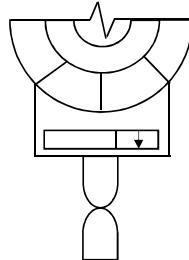
Pitot Type: Detachable Tip Fixed PM10

Wind Tunnel Calibration? No Yes \Rightarrow Coefficient: A side
B side

Diagram 1



Degree indicating level position for determining α_1 and α_2 .



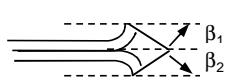
Level?	<input type="checkbox"/> Yes
Obstructions?	<input type="checkbox"/> No
Damaged?	<input type="checkbox"/> No

Diagram 1

$$-10^\circ < \alpha_1 < +10^\circ = \boxed{0}$$

$$-10^\circ < \alpha_2 < +10^\circ = \boxed{1}$$

Diagram 2



Degree indicating level position for determining β_1 and β_2 .

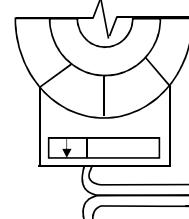
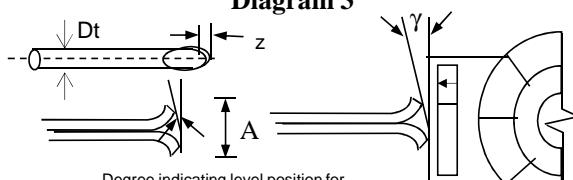


Diagram 2

$$-5^\circ < \beta_1 < +5^\circ = \boxed{0}$$

$$-5^\circ < \beta_2 < +5^\circ = \boxed{0}$$

Diagram 3



Degree indicating level position for determining γ then calculate z .

Diagram 3

$$\gamma = \boxed{0}$$

$$\Theta = \boxed{0}$$

$$A = \boxed{0.635}$$

$$P_a = P_b = A/2 = \boxed{0.318}$$

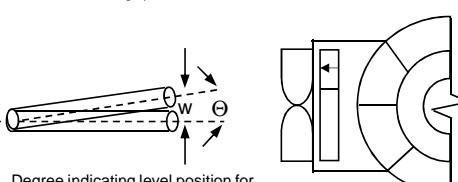
$$0.188" \leq D_t \leq 0.375" = \boxed{0.253}$$

$$1.05 D_t < A/2 < 1.5 D_t = \boxed{\text{YES}}$$

$$z = A \tan \gamma < 0.125" = \boxed{0.0000}$$

$$w = A \tan \Theta < 0.03125" = \boxed{0.0000}$$

$$w \text{ and } z \text{ meet specs?} = \boxed{\text{YES}}$$



Degree indicating level position for determining θ then calculate w .

Comments: S-type w/ 1/4" tubing and 3/4" sheath
4-foot length

NOTES:

- For Method 5 configurations verify the 3/4 inch separation between the pitot tube and the nozzle.
- For Method 5 configurations verify that the thermocouple is either set back 2 inches from the pitot tube opening or has a 3/4 inch separation.
- As per Method 2, a pitot tube/probe that meets all criteria and design features is assigned a 0.84 coefficient.

Probe Thermocouple Calibration:

Expected Stack Temperature(T_s)	400 °F	% Change	Allowable
Reference Thermometer(T_{ref}) boiling pt	71 °F		
Thermocouple Readout	70.9 °F	0.14%	1.50%
Reference Thermometer(T_{ref}) freezing pt	34 °F		
Thermocouple Readout	34.3 °F	-0.88%	1.50%

Secondary Standard

DATE: 9/27/2015

Operator: Joe Ward

Meter No: V2059			Meter Box H@:			0.0000			Meter Box Yd			0.9975			Barometric Pressure:		
			Standard Meter Gas Volume			Meter Box Gas Volume (ft ³)			Std. Meter Temperature (F)			Meter Box Temperature (F)					
Q	P	H	Yds	Initial	Final	Vf	Initial	Final	Vf	Inlet	Outlet	Avg.	Inlet	Outlet	Avg.	Time	Yd
0.04	-0.50	0.00	1.0000	0.0	1.000	1.000	.000	1.068	1.068	73.0	73.0	73.0	107.0	107.0	107.0	26.91	0.9973
0.04	-0.50	0.00	1.0000	0.0	1.010	1.010	0.000	1.080	1.080	73.0	73.0	73.0	107.0	107.0	107.0	27.12	0.9961
0.04	-0.50	0.00	1.0000	0.0	1.035	1.035	.000	1.104	1.104	73.0	73.0	73.0	107.0	107.0	107.0	27.71	0.9985
0.04	-0.50	0.00	1.0000	0.0	1.000	1.000	.000	1.067	1.067	73.0	73.0	73.0	107.0	107.0	107.0	26.98	0.9982
															AVERAGE 0.9975		

Wet Test Meter Standard # 11AA8

Date of Calibration: 4/22/15



Millennium Instruments Inc.

2402 Springridge Drive unit A

Spring Grove IL 60081

PHONE#(815)675-3225

FAX#(815)675-6965

E-mail: millennium@millinst.com
www.millinst.com



Secondary Standard

DATE: 2/9/2015

Operator: Joe Ward

Meter No: V2060			Meter Box H@:			0.0000			Meter Box Yd			1.0061			Barometric Pressure:		
Standard Meter Gas Volume			Meter Box Gas Volume (ft ³)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)								
Q	P	H	Yds	Initial	Final	Vf	Initial	Final	Vf	Inlet	Outlet	Avg.	Inlet	Outlet	Avg.	Time	Yd
0.04	-0.40	0.00	1.0000	0.0	1.000	1.000	.000	1.065	1.065	78.0	78.0	78.0	116.0	115.0	115.5	27.16	1.0054
0.04	-0.40	0.00	1.0000	0.0	1.000	1.000	0.000	1.063	1.063	78.0	78.0	78.0	116.0	115.0	115.5	27.36	1.0073
0.04	-0.40	0.00	1.0000	0.0	1.000	1.000	.000	1.065	1.065	78.0	78.0	78.0	116.0	115.0	115.5	27.30	1.0054
0.04	-0.40	0.00	1.0000	0.0	1.000	1.000	.000	1.064	1.064	78.0	78.0	78.0	116.0	115.0	115.5	27.40	1.0064

Canomara LLC
Critical Orifice Calibration

Date: 2/3/2016
DGM ID: 2176
Technician: E. Bali

Critical Orifice Id No.: Critical Vacuum K' factor Run Number	CM1-4		CM1-5		CM1-2	
	15 0.378	15 0.593	15 0.696	1	2	
DGM Final Reading (ft ³)	931.384	937.112	943.045	948.935	954.171	959.39
DGM Initial Reading (ft ³)	925.637	931.384	937.112	943.045	948.935	954.171
Difference, Vm (ft ³)	5.747	5.728	5.933	5.890	5.236	5.219
Volume Criteria Met (>5ft ³)	Yes	Yes	Yes	Yes	Yes	Yes
DGM Initial (°F)	47.5	48	49.5	50	47.5	48
DGM Final (°F)	48	48.5	50	50.5	48	48
Average Temp., Tm	47.75	48.25	49.75	50.25	47.75	48
Time (min)	12	12	8	8	6	6
Delta H (in. H ₂ O)	0.78	0.78	1.8	1.8	2.7	2.7
Pbar (in. Hg)	30.06	30.06	30.06	30.06	30.06	30.06
Ambient Temp (°F)	65	65	65	65	65	65
Pump Vacuum (in. Hg)	23	23	23	23	23	23
Vm(std) (ft ³)	6.013	5.987	6.199	6.148	5.504	5.484
Vcr(std) (ft ³)	5.951	5.951	6.224	6.224	5.479	5.479
DGM Cal. Factor, Y	0.990	0.994	1.004	1.012	0.995	0.999
Y Average		0.992		1.008		0.997
Y Dev. from avg. ¹		0.21%		0.41%		0.19%
Y Dev. from other ²	Max Y:	1.008	Min Y:	0.992	Y deviation:	1.65% good
Delta H@	1.827	1.825	1.707	1.705	1.866	1.865
Delta H@ Average		1.826		1.706		1.865
Delta H Dev. from avg. ³		0.05%		0.05%		0.02%
Average Y =	0.999					
Average Delta H =	1.799					

- Y at each of the flow rates should not differ by more than +/- 2.0% from the average
- If any critical orifice yields a DGM Y factor differing by more than 2% from others, recalibrate orifices
- Average Delta H@ must be within 0.15 of the average

$$Vm(\text{std}) = 17.64 \cdot Vm \cdot (Pbar + \text{deltaH}/13.6) / (Tm + 460)$$

$$Vcr(\text{std}) = K' \cdot Pbar \cdot \text{Time} / \text{SQRT}(Tamb + 460)$$

$$Y = Vcr(\text{std}) / Vm(\text{std})$$

APPENDIX F

HFID Continuous Monitoring Data

Test 1: Heated Flame Ionization Detector Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

	Concentration (ppm as propane)
8/10/2016 3:23 PM	258.57
8/10/2016 3:24 PM	274.93
8/10/2016 3:25 PM	255.94
8/10/2016 3:26 PM	243.1
8/10/2016 3:27 PM	216.56
8/10/2016 3:28 PM	5
8/10/2016 3:29 PM	4.09
8/10/2016 3:30 PM	2.67
8/10/2016 3:31 PM	0.86
8/10/2016 3:32 PM	3.93
8/10/2016 3:33 PM	242.59
8/10/2016 3:34 PM	248.24
8/10/2016 3:35 PM	95.55
8/10/2016 3:36 PM	24.01
8/10/2016 3:37 PM	23.93
8/10/2016 3:38 PM	38.34
8/10/2016 3:39 PM	44.55
8/10/2016 3:40 PM	44.42
8/10/2016 3:41 PM	43.2
8/10/2016 3:42 PM	41.42
8/10/2016 3:43 PM	154.45
8/10/2016 3:44 PM	233.92
8/10/2016 3:45 PM	258.33
8/10/2016 3:46 PM	238.05
8/10/2016 3:47 PM	242.21
8/10/2016 3:48 PM	249.45
8/10/2016 3:49 PM	235.51
8/10/2016 3:50 PM	258.97
8/10/2016 3:51 PM	239.87
8/10/2016 3:52 PM	246.98
8/10/2016 3:53 PM	239.64
8/10/2016 3:54 PM	245.8
8/10/2016 3:55 PM	244.97
8/10/2016 3:56 PM	246.92
8/10/2016 3:57 PM	109.87
8/10/2016 3:58 PM	30.28
8/10/2016 3:59 PM	30.19
8/10/2016 4:00 PM	45.96
8/10/2016 4:01 PM	55.31
8/10/2016 4:02 PM	55.4
8/10/2016 4:03 PM	55.11
8/10/2016 4:04 PM	54.34
8/10/2016 4:05 PM	139.75
8/10/2016 4:06 PM	241.49
8/10/2016 4:07 PM	241.64
8/10/2016 4:08 PM	272.76
8/10/2016 4:09 PM	254.36
8/10/2016 4:10 PM	247.33
8/10/2016 4:11 PM	278.34
8/10/2016 4:12 PM	232.57
8/10/2016 4:13 PM	280.91
8/10/2016 4:14 PM	233
8/10/2016 4:15 PM	269.24
8/10/2016 4:16 PM	244.36
8/10/2016 4:17 PM	238.06
8/10/2016 4:18 PM	282.79
8/10/2016 4:19 PM	148.9
8/10/2016 4:20 PM	30.63
8/10/2016 4:21 PM	32.91
8/10/2016 4:22 PM	41.1
RUN 1 AVERAGE	159.89
RUN 1 MAXIMUM	282.79

Test 2: Heated Flame Ionization Detector Data

Sterilizer Initial Performance Test
Covidien - North Haven, CT

	Concentration (ppm as propane)
8/10/2016 4:55 PM	242.32
8/10/2016 4:56 PM	264.91
8/10/2016 4:57 PM	259.5
8/10/2016 4:58 PM	240.68
8/10/2016 4:59 PM	247.11
8/10/2016 5:00 PM	243.35
8/10/2016 5:01 PM	249.7
8/10/2016 5:02 PM	246.34
8/10/2016 5:03 PM	264.81
8/10/2016 5:04 PM	267.19
8/10/2016 5:05 PM	265.25
8/10/2016 5:06 PM	258.94
8/10/2016 5:07 PM	260.8
8/10/2016 5:08 PM	257.39
8/10/2016 5:09 PM	254.35
8/10/2016 5:10 PM	255.29
8/10/2016 5:11 PM	255.38
8/10/2016 5:12 PM	260.63
8/10/2016 5:13 PM	263.19
8/10/2016 5:14 PM	260.89
8/10/2016 5:15 PM	255.71
8/10/2016 5:16 PM	256.28
8/10/2016 5:17 PM	262.52
8/10/2016 5:18 PM	269.62
8/10/2016 5:19 PM	263.64
8/10/2016 5:20 PM	258.64
8/10/2016 5:21 PM	248.36
8/10/2016 5:22 PM	245.36
8/10/2016 5:23 PM	249.58
8/10/2016 5:24 PM	250.23
8/10/2016 5:25 PM	246.72
8/10/2016 5:26 PM	245.38
8/10/2016 5:27 PM	238.49
8/10/2016 5:28 PM	238.38
8/10/2016 5:29 PM	240.04
8/10/2016 5:30 PM	238.77
8/10/2016 5:31 PM	230.52
8/10/2016 5:32 PM	225.36
8/10/2016 5:33 PM	222.14
8/10/2016 5:34 PM	225.76
8/10/2016 5:35 PM	229.48
8/10/2016 5:36 PM	225.64
8/10/2016 5:37 PM	225.24
8/10/2016 5:38 PM	224.36
8/10/2016 5:39 PM	224.32
8/10/2016 5:40 PM	228.07
8/10/2016 5:41 PM	227.96
8/10/2016 5:42 PM	225.44
8/10/2016 5:43 PM	223.78
8/10/2016 5:44 PM	221.09
8/10/2016 5:45 PM	223.86
8/10/2016 5:46 PM	220.61
8/10/2016 5:47 PM	216.37
8/10/2016 5:48 PM	214.15
8/10/2016 5:49 PM	211.94
8/10/2016 5:50 PM	209.05
8/10/2016 5:51 PM	207.93
8/10/2016 5:52 PM	202.98
8/10/2016 5:53 PM	185.33
8/10/2016 5:54 PM	179
RUN 2 AVERAGE	239.27
RUN 2 MAXIMUM	269.62

Test 3: Heated Flame Ionization Detector DataSterilizer Initial Performance Test
Covidien - North Haven, CT

	Concentration (ppm as propane)
8/10/2016 6:51 PM	264.88
8/10/2016 6:52 PM	283.17
8/10/2016 6:53 PM	274.26
8/10/2016 6:54 PM	245.19
8/10/2016 6:55 PM	276.29
8/10/2016 6:56 PM	233.95
8/10/2016 6:57 PM	284.4
8/10/2016 6:58 PM	251.86
8/10/2016 6:59 PM	279.97
8/10/2016 7:00 PM	253.1
8/10/2016 7:01 PM	270.82
8/10/2016 7:02 PM	264.45
8/10/2016 7:03 PM	251.86
8/10/2016 7:04 PM	277.57
8/10/2016 7:05 PM	257.47
8/10/2016 7:06 PM	50.17
8/10/2016 7:07 PM	26.51
8/10/2016 7:08 PM	35.98
8/10/2016 7:09 PM	49.9
8/10/2016 7:10 PM	50.3
8/10/2016 7:11 PM	50.11
8/10/2016 7:12 PM	52.58
8/10/2016 7:13 PM	113.16
8/10/2016 7:14 PM	244.63
8/10/2016 7:15 PM	269.97
8/10/2016 7:16 PM	257.57
8/10/2016 7:17 PM	256.37
8/10/2016 7:18 PM	269.27
8/10/2016 7:19 PM	276.59
8/10/2016 7:20 PM	269.63
8/10/2016 7:21 PM	246.86
8/10/2016 7:22 PM	285.52
8/10/2016 7:23 PM	258.28
8/10/2016 7:24 PM	261.96
8/10/2016 7:25 PM	266.18
8/10/2016 7:26 PM	262.58
8/10/2016 7:27 PM	256.93
8/10/2016 7:28 PM	76.39
8/10/2016 7:29 PM	36.33
8/10/2016 7:30 PM	49.41
8/10/2016 7:31 PM	64.86
8/10/2016 7:32 PM	69.77
8/10/2016 7:33 PM	70.63
8/10/2016 7:34 PM	69.25
8/10/2016 7:35 PM	101.51
8/10/2016 7:36 PM	274.74
8/10/2016 7:37 PM	249.78
8/10/2016 7:38 PM	278.69
8/10/2016 7:39 PM	271.91
8/10/2016 7:40 PM	256.73
8/10/2016 7:41 PM	261.24
8/10/2016 7:42 PM	275.71
8/10/2016 7:43 PM	264.67
8/10/2016 7:44 PM	250.51
8/10/2016 7:45 PM	267.03
8/10/2016 7:46 PM	263.47
8/10/2016 7:47 PM	253.39
8/10/2016 7:48 PM	256.43
8/10/2016 7:49 PM	273.17
8/10/2016 7:50 PM	140.74
RUN 3 AVERAGE	207.61
RUN 3 MAXIMUM	285.52

APPENDIX G

OXIDIZER EXIT TEMPERATURE MONITORING DATA

Test 1: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 15:23	166.4
10/8/2016 15:23	166.6
10/8/2016 15:23	166.8
10/8/2016 15:23	167.0
10/8/2016 15:23	167.2
10/8/2016 15:23	167.4
10/8/2016 15:24	167.6
10/8/2016 15:24	167.8
10/8/2016 15:24	167.9
10/8/2016 15:24	168.1
10/8/2016 15:24	168.3
10/8/2016 15:24	168.6
10/8/2016 15:25	168.8
10/8/2016 15:25	169.0
10/8/2016 15:25	169.2
10/8/2016 15:25	169.4
10/8/2016 15:25	169.6
10/8/2016 15:25	169.8
10/8/2016 15:26	170.0
10/8/2016 15:26	170.2
10/8/2016 15:26	170.4
10/8/2016 15:26	170.6
10/8/2016 15:26	170.7
10/8/2016 15:26	170.9
10/8/2016 15:27	171.1
10/8/2016 15:27	171.4
10/8/2016 15:27	171.5
10/8/2016 15:27	171.8
10/8/2016 15:27	171.9
10/8/2016 15:27	172.1
10/8/2016 15:28	172.3
10/8/2016 15:28	172.5
10/8/2016 15:28	172.7
10/8/2016 15:28	172.8
10/8/2016 15:28	173.0
10/8/2016 15:28	173.2
10/8/2016 15:29	173.3
10/8/2016 15:29	173.5
10/8/2016 15:29	173.7
10/8/2016 15:29	173.8
10/8/2016 15:29	174.0

Test 1: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 15:29	174.1
10/8/2016 15:30	174.3
10/8/2016 15:30	174.4
10/8/2016 15:30	174.7
10/8/2016 15:30	174.8
10/8/2016 15:30	174.9
10/8/2016 15:30	175.1
10/8/2016 15:31	175.2
10/8/2016 15:31	175.4
10/8/2016 15:31	175.6
10/8/2016 15:31	175.8
10/8/2016 15:31	175.9
10/8/2016 15:31	176.0
10/8/2016 15:32	176.2
10/8/2016 15:32	176.3
10/8/2016 15:32	176.5
10/8/2016 15:32	176.6
10/8/2016 15:32	176.8
10/8/2016 15:32	177.0
10/8/2016 15:33	177.1
10/8/2016 15:33	177.3
10/8/2016 15:33	177.4
10/8/2016 15:33	177.6
10/8/2016 15:33	177.7
10/8/2016 15:33	177.9
10/8/2016 15:34	178.1
10/8/2016 15:34	178.3
10/8/2016 15:34	178.4
10/8/2016 15:34	178.6
10/8/2016 15:34	178.7
10/8/2016 15:34	178.9
10/8/2016 15:35	179.1
10/8/2016 15:35	179.2
10/8/2016 15:35	179.3
10/8/2016 15:35	179.4
10/8/2016 15:35	179.5
10/8/2016 15:35	179.6
10/8/2016 15:36	179.7
10/8/2016 15:36	179.8
10/8/2016 15:36	179.9
10/8/2016 15:36	179.9

Test 1: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 15:36	179.9
10/8/2016 15:36	180.0
10/8/2016 15:37	180.1
10/8/2016 15:37	180.0
10/8/2016 15:37	180.0
10/8/2016 15:37	179.9
10/8/2016 15:37	179.9
10/8/2016 15:37	179.9
10/8/2016 15:38	179.9
10/8/2016 15:38	179.8
10/8/2016 15:38	179.7
10/8/2016 15:38	179.7
10/8/2016 15:38	179.6
10/8/2016 15:38	179.5
10/8/2016 15:39	179.4
10/8/2016 15:39	179.3
10/8/2016 15:39	179.1
10/8/2016 15:39	179.0
10/8/2016 15:39	178.9
10/8/2016 15:39	178.7
10/8/2016 15:40	178.5
10/8/2016 15:40	178.4
10/8/2016 15:40	178.2
10/8/2016 15:40	178.0
10/8/2016 15:40	177.9
10/8/2016 15:40	177.6
10/8/2016 15:41	177.4
10/8/2016 15:41	177.2
10/8/2016 15:41	177.1
10/8/2016 15:41	176.9
10/8/2016 15:41	176.7
10/8/2016 15:41	176.5
10/8/2016 15:42	176.3
10/8/2016 15:42	176.1
10/8/2016 15:42	175.9
10/8/2016 15:42	175.7
10/8/2016 15:42	175.6
10/8/2016 15:42	175.3
10/8/2016 15:43	175.1
10/8/2016 15:43	175.0
10/8/2016 15:43	174.8

Test 1: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 15:43	174.6
10/8/2016 15:43	174.5
10/8/2016 15:43	174.3
10/8/2016 15:44	174.1
10/8/2016 15:44	174.0
10/8/2016 15:44	173.9
10/8/2016 15:44	173.7
10/8/2016 15:44	173.6
10/8/2016 15:44	173.5
10/8/2016 15:45	173.4
10/8/2016 15:45	173.3
10/8/2016 15:45	173.2
10/8/2016 15:45	173.1
10/8/2016 15:45	173.0
10/8/2016 15:45	172.9
10/8/2016 15:46	172.8
10/8/2016 15:46	172.7
10/8/2016 15:46	172.7
10/8/2016 15:46	172.6
10/8/2016 15:46	172.5
10/8/2016 15:46	172.3
10/8/2016 15:47	172.3
10/8/2016 15:47	172.2
10/8/2016 15:47	172.0
10/8/2016 15:47	172.1
10/8/2016 15:47	172.0
10/8/2016 15:47	171.8
10/8/2016 15:48	171.8
10/8/2016 15:48	171.7
10/8/2016 15:48	171.6
10/8/2016 15:48	171.6
10/8/2016 15:48	171.4
10/8/2016 15:48	171.4
10/8/2016 15:49	171.3
10/8/2016 15:49	171.2
10/8/2016 15:49	171.1
10/8/2016 15:49	171.1
10/8/2016 15:49	171.0
10/8/2016 15:49	170.9
10/8/2016 15:50	170.8
10/8/2016 15:50	170.8

Test 1: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 15:50	170.7
10/8/2016 15:50	170.6
10/8/2016 15:50	170.5
10/8/2016 15:50	170.5
10/8/2016 15:51	170.4
10/8/2016 15:51	170.3
10/8/2016 15:51	170.3
10/8/2016 15:51	170.2
10/8/2016 15:51	170.2
10/8/2016 15:51	170.1
10/8/2016 15:52	170.0
10/8/2016 15:52	170.0
10/8/2016 15:52	169.9
10/8/2016 15:52	169.9
10/8/2016 15:52	169.8
10/8/2016 15:53	169.8
10/8/2016 15:53	169.9
10/8/2016 15:53	169.9
10/8/2016 15:53	169.9
10/8/2016 15:54	169.9
10/8/2016 15:54	169.9
10/8/2016 15:54	169.9
10/8/2016 15:54	170.0
10/8/2016 15:54	170.1
10/8/2016 15:54	170.2
10/8/2016 15:55	170.3
10/8/2016 15:55	170.3
10/8/2016 15:55	170.4
10/8/2016 15:55	170.5
10/8/2016 15:55	170.6
10/8/2016 15:55	170.7
10/8/2016 15:56	170.8
10/8/2016 15:56	170.9
10/8/2016 15:56	171.1
10/8/2016 15:56	171.2
10/8/2016 15:56	171.4
10/8/2016 15:56	171.5
10/8/2016 15:57	171.7

Test 1: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 15:57	171.9
10/8/2016 15:57	172.1
10/8/2016 15:57	172.3
10/8/2016 15:57	172.5
10/8/2016 15:57	172.7
10/8/2016 15:58	172.8
10/8/2016 15:58	173.0
10/8/2016 15:58	173.2
10/8/2016 15:58	173.3
10/8/2016 15:58	173.6
10/8/2016 15:58	173.7
10/8/2016 15:59	173.9
10/8/2016 15:59	174.1
10/8/2016 15:59	174.3
10/8/2016 15:59	174.5
10/8/2016 15:59	174.7
10/8/2016 15:59	174.9
10/8/2016 16:00	175.1
10/8/2016 16:00	175.3
10/8/2016 16:00	175.5
10/8/2016 16:00	175.7
10/8/2016 16:00	175.9
10/8/2016 16:00	176.2
10/8/2016 16:01	176.3
10/8/2016 16:01	176.6
10/8/2016 16:01	176.7
10/8/2016 16:01	176.9
10/8/2016 16:01	177.1
10/8/2016 16:01	177.3
10/8/2016 16:02	177.5
10/8/2016 16:02	177.7
10/8/2016 16:02	177.9
10/8/2016 16:02	178.0
10/8/2016 16:02	178.2
10/8/2016 16:02	178.4
10/8/2016 16:03	178.6
10/8/2016 16:03	178.7
10/8/2016 16:03	178.9
10/8/2016 16:03	179.0
10/8/2016 16:03	179.1
10/8/2016 16:03	179.3

Test 1: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 16:04	179.4
10/8/2016 16:04	179.5
10/8/2016 16:04	179.7
10/8/2016 16:04	179.8
10/8/2016 16:04	179.9
10/8/2016 16:04	180.0
10/8/2016 16:05	180.1
10/8/2016 16:05	180.2
10/8/2016 16:05	180.3
10/8/2016 16:05	180.3
10/8/2016 16:05	180.4
10/8/2016 16:05	180.5
10/8/2016 16:06	180.5
10/8/2016 16:06	180.6
10/8/2016 16:06	180.6
10/8/2016 16:06	180.6
10/8/2016 16:06	180.6
10/8/2016 16:06	180.6
10/8/2016 16:07	180.6
10/8/2016 16:07	180.7
10/8/2016 16:07	180.6
10/8/2016 16:07	180.6
10/8/2016 16:07	180.6
10/8/2016 16:07	180.6
10/8/2016 16:08	180.5
10/8/2016 16:08	180.4
10/8/2016 16:08	180.4
10/8/2016 16:08	180.3
10/8/2016 16:08	180.2
10/8/2016 16:08	180.0
10/8/2016 16:09	179.9
10/8/2016 16:09	179.8
10/8/2016 16:09	179.7
10/8/2016 16:09	179.6
10/8/2016 16:09	179.4
10/8/2016 16:09	179.3
10/8/2016 16:10	179.1
10/8/2016 16:10	179.0
10/8/2016 16:10	178.8
10/8/2016 16:10	178.6
10/8/2016 16:10	178.4

Test 1: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 16:10	178.2
10/8/2016 16:11	178.0
10/8/2016 16:11	177.8
10/8/2016 16:11	177.6
10/8/2016 16:11	177.4
10/8/2016 16:11	177.2
10/8/2016 16:11	177.0
10/8/2016 16:12	176.8
10/8/2016 16:12	176.6
10/8/2016 16:12	176.4
10/8/2016 16:12	176.2
10/8/2016 16:12	175.9
10/8/2016 16:12	175.8
10/8/2016 16:13	175.6
10/8/2016 16:13	175.4
10/8/2016 16:13	175.2
10/8/2016 16:13	175.0
10/8/2016 16:13	174.8
10/8/2016 16:13	174.7
10/8/2016 16:14	174.5
10/8/2016 16:14	174.4
10/8/2016 16:14	174.2
10/8/2016 16:14	174.1
10/8/2016 16:14	173.9
10/8/2016 16:14	173.8
10/8/2016 16:15	173.7
10/8/2016 16:15	173.6
10/8/2016 16:15	173.5
10/8/2016 16:15	173.4
10/8/2016 16:15	173.4
10/8/2016 16:16	173.2
10/8/2016 16:16	173.2
10/8/2016 16:16	173.2
10/8/2016 16:16	173.2
10/8/2016 16:16	173.2
10/8/2016 16:17	173.2
10/8/2016 16:17	173.3
10/8/2016 16:17	173.3
10/8/2016 16:17	173.3

Test 1: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 16:17	173.4
10/8/2016 16:17	173.5
10/8/2016 16:18	173.5
10/8/2016 16:18	173.6
10/8/2016 16:18	173.7
10/8/2016 16:18	173.8
10/8/2016 16:18	173.9
10/8/2016 16:18	174.1
10/8/2016 16:19	174.2
10/8/2016 16:19	174.4
10/8/2016 16:19	174.5
10/8/2016 16:19	174.7
10/8/2016 16:19	174.8
10/8/2016 16:19	175.0
10/8/2016 16:20	175.2
10/8/2016 16:20	175.3
10/8/2016 16:20	175.5
10/8/2016 16:20	175.7
10/8/2016 16:20	176.0
10/8/2016 16:20	176.1
10/8/2016 16:21	176.3
10/8/2016 16:21	176.5
10/8/2016 16:21	176.6
10/8/2016 16:21	176.8
10/8/2016 16:21	176.9
10/8/2016 16:21	177.1
10/8/2016 16:22	177.3
10/8/2016 16:22	177.5
10/8/2016 16:22	177.7
10/8/2016 16:22	177.9
10/8/2016 16:22	178.1
10/8/2016 16:22	178.3
RUN 1 AVERAGE	174.9

Test 2: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 16:55	179.1
10/8/2016 16:55	178.9
10/8/2016 16:55	178.7
10/8/2016 16:55	178.5
10/8/2016 16:55	178.2
10/8/2016 16:55	178.0
10/8/2016 16:56	177.8
10/8/2016 16:56	177.6
10/8/2016 16:56	177.3
10/8/2016 16:56	177.0
10/8/2016 16:56	176.8
10/8/2016 16:56	176.6
10/8/2016 16:57	176.3
10/8/2016 16:57	176.0
10/8/2016 16:57	175.8
10/8/2016 16:57	175.6
10/8/2016 16:57	175.3
10/8/2016 16:57	175.2
10/8/2016 16:58	175.0
10/8/2016 16:58	174.8
10/8/2016 16:58	174.6
10/8/2016 16:58	174.3
10/8/2016 16:58	174.2
10/8/2016 16:58	174.0
10/8/2016 16:59	173.8
10/8/2016 16:59	173.8
10/8/2016 16:59	173.6
10/8/2016 16:59	173.4
10/8/2016 16:59	173.3
10/8/2016 16:59	173.2
10/8/2016 17:00	173.1
10/8/2016 17:00	173.0
10/8/2016 17:00	172.9
10/8/2016 17:00	172.8
10/8/2016 17:00	172.7
10/8/2016 17:00	172.7
10/8/2016 17:01	172.7
10/8/2016 17:01	172.7
10/8/2016 17:01	172.7
10/8/2016 17:01	172.7
10/8/2016 17:01	172.7

Test 2: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 17:01	172.7
10/8/2016 17:02	172.7
10/8/2016 17:02	172.8
10/8/2016 17:02	172.9
10/8/2016 17:02	172.9
10/8/2016 17:02	173.0
10/8/2016 17:02	173.1
10/8/2016 17:03	173.2
10/8/2016 17:03	173.3
10/8/2016 17:03	173.6
10/8/2016 17:03	173.6
10/8/2016 17:03	173.8
10/8/2016 17:03	174.0
10/8/2016 17:04	174.1
10/8/2016 17:04	174.3
10/8/2016 17:04	174.5
10/8/2016 17:04	174.7
10/8/2016 17:04	174.9
10/8/2016 17:04	175.0
10/8/2016 17:05	175.3
10/8/2016 17:05	175.5
10/8/2016 17:05	175.7
10/8/2016 17:05	175.9
10/8/2016 17:05	176.2
10/8/2016 17:05	176.3
10/8/2016 17:06	176.6
10/8/2016 17:06	176.8
10/8/2016 17:06	177.0
10/8/2016 17:06	177.2
10/8/2016 17:06	177.4
10/8/2016 17:06	177.6
10/8/2016 17:07	177.9
10/8/2016 17:07	178.1
10/8/2016 17:07	178.3
10/8/2016 17:07	178.5
10/8/2016 17:07	178.7
10/8/2016 17:07	178.9
10/8/2016 17:08	179.1
10/8/2016 17:08	179.4
10/8/2016 17:08	179.6
10/8/2016 17:08	179.7

Test 2: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 17:08	180.0
10/8/2016 17:08	180.1
10/8/2016 17:09	180.3
10/8/2016 17:09	180.5
10/8/2016 17:09	180.7
10/8/2016 17:09	180.8
10/8/2016 17:09	181.0
10/8/2016 17:09	181.2
10/8/2016 17:10	181.3
10/8/2016 17:10	181.4
10/8/2016 17:10	181.6
10/8/2016 17:10	181.7
10/8/2016 17:10	181.8
10/8/2016 17:10	182.0
10/8/2016 17:11	182.1
10/8/2016 17:11	182.2
10/8/2016 17:11	182.4
10/8/2016 17:11	182.5
10/8/2016 17:11	182.6
10/8/2016 17:11	182.7
10/8/2016 17:12	182.8
10/8/2016 17:12	182.8
10/8/2016 17:12	182.9
10/8/2016 17:12	183.0
10/8/2016 17:12	183.1
10/8/2016 17:12	183.2
10/8/2016 17:13	183.2
10/8/2016 17:13	183.3
10/8/2016 17:13	183.4
10/8/2016 17:13	183.4
10/8/2016 17:13	183.6
10/8/2016 17:13	183.6
10/8/2016 17:14	183.6
10/8/2016 17:14	183.8
10/8/2016 17:14	183.8
10/8/2016 17:14	183.8
10/8/2016 17:14	183.9
10/8/2016 17:14	183.9
10/8/2016 17:15	184.0
10/8/2016 17:15	184.1
10/8/2016 17:15	184.1

Test 2: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 17:15	184.2
10/8/2016 17:15	184.2
10/8/2016 17:15	184.3
10/8/2016 17:16	184.4
10/8/2016 17:16	184.4
10/8/2016 17:16	184.4
10/8/2016 17:16	184.5
10/8/2016 17:16	184.6
10/8/2016 17:16	184.6
10/8/2016 17:17	184.6
10/8/2016 17:17	184.7
10/8/2016 17:17	184.7
10/8/2016 17:17	184.8
10/8/2016 17:17	184.9
10/8/2016 17:18	184.9
10/8/2016 17:18	185.0
10/8/2016 17:18	185.0
10/8/2016 17:18	185.1
10/8/2016 17:18	185.1
10/8/2016 17:18	185.2
10/8/2016 17:19	185.2
10/8/2016 17:19	185.2
10/8/2016 17:19	185.3
10/8/2016 17:19	185.4
10/8/2016 17:19	185.4
10/8/2016 17:19	185.4
10/8/2016 17:20	185.5
10/8/2016 17:20	185.5
10/8/2016 17:20	185.5
10/8/2016 17:20	185.6
10/8/2016 17:20	185.7
10/8/2016 17:20	185.7
10/8/2016 17:21	185.7
10/8/2016 17:21	185.7
10/8/2016 17:21	185.8
10/8/2016 17:21	185.8
10/8/2016 17:21	185.9
10/8/2016 17:21	185.9
10/8/2016 17:22	185.9
10/8/2016 17:22	186.0

Test 2: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 17:22	185.9
10/8/2016 17:22	186.0
10/8/2016 17:22	186.0
10/8/2016 17:22	186.0
10/8/2016 17:23	186.1
10/8/2016 17:23	186.1
10/8/2016 17:23	186.2
10/8/2016 17:23	186.2
10/8/2016 17:23	186.2
10/8/2016 17:23	186.3
10/8/2016 17:24	186.3
10/8/2016 17:24	186.3
10/8/2016 17:24	186.3
10/8/2016 17:24	186.4
10/8/2016 17:24	186.3
10/8/2016 17:25	186.4
10/8/2016 17:25	186.4
10/8/2016 17:25	186.5
10/8/2016 17:25	186.5
10/8/2016 17:25	186.5
10/8/2016 17:26	186.5
10/8/2016 17:26	186.5
10/8/2016 17:26	186.5
10/8/2016 17:26	186.6
10/8/2016 17:26	186.6
10/8/2016 17:27	186.6
10/8/2016 17:27	186.6
10/8/2016 17:27	186.6
10/8/2016 17:27	186.6
10/8/2016 17:28	186.6
10/8/2016 17:28	186.7
10/8/2016 17:28	186.7
10/8/2016 17:28	186.7
10/8/2016 17:28	186.7
10/8/2016 17:29	186.7

Test 2: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 17:29	186.7
10/8/2016 17:29	186.7
10/8/2016 17:29	186.7
10/8/2016 17:29	186.7
10/8/2016 17:29	186.7
10/8/2016 17:29	186.7
10/8/2016 17:30	186.7
10/8/2016 17:30	186.7
10/8/2016 17:30	186.7
10/8/2016 17:30	186.8
10/8/2016 17:30	186.8
10/8/2016 17:31	186.8
10/8/2016 17:31	186.8
10/8/2016 17:31	186.8
10/8/2016 17:31	186.8
10/8/2016 17:31	186.8
10/8/2016 17:32	186.7
10/8/2016 17:32	186.8
10/8/2016 17:32	186.8
10/8/2016 17:32	186.7
10/8/2016 17:33	186.7
10/8/2016 17:33	186.7
10/8/2016 17:33	186.7
10/8/2016 17:33	186.7
10/8/2016 17:33	186.6
10/8/2016 17:33	186.7
10/8/2016 17:34	186.7
10/8/2016 17:34	186.7
10/8/2016 17:34	186.7
10/8/2016 17:34	186.6
10/8/2016 17:35	186.6
10/8/2016 17:35	186.6
10/8/2016 17:35	186.5
10/8/2016 17:35	186.5
10/8/2016 17:35	186.5

Test 2: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 17:36	186.5
10/8/2016 17:36	186.5
10/8/2016 17:36	186.5
10/8/2016 17:36	186.4
10/8/2016 17:36	186.4
10/8/2016 17:36	186.4
10/8/2016 17:37	186.4
10/8/2016 17:37	186.3
10/8/2016 17:37	186.3
10/8/2016 17:37	186.3
10/8/2016 17:37	186.2
10/8/2016 17:37	186.2
10/8/2016 17:38	186.3
10/8/2016 17:38	186.2
10/8/2016 17:38	186.2
10/8/2016 17:38	186.1
10/8/2016 17:39	186.1
10/8/2016 17:39	186.0
10/8/2016 17:39	186.0
10/8/2016 17:39	186.0
10/8/2016 17:40	186.0
10/8/2016 17:40	186.0
10/8/2016 17:40	186.0
10/8/2016 17:40	186.0
10/8/2016 17:40	185.9
10/8/2016 17:40	186.0
10/8/2016 17:41	185.9
10/8/2016 17:41	185.9
10/8/2016 17:41	185.9
10/8/2016 17:41	185.9
10/8/2016 17:41	185.9
10/8/2016 17:42	185.8
10/8/2016 17:42	185.8
10/8/2016 17:42	185.8
10/8/2016 17:42	185.7

Test 2: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 17:42	185.7
10/8/2016 17:43	185.7
10/8/2016 17:43	185.6
10/8/2016 17:43	185.6
10/8/2016 17:43	185.5
10/8/2016 17:43	185.5
10/8/2016 17:43	185.5
10/8/2016 17:44	185.5
10/8/2016 17:44	185.4
10/8/2016 17:44	185.4
10/8/2016 17:44	185.3
10/8/2016 17:44	185.2
10/8/2016 17:44	185.2
10/8/2016 17:45	185.1
10/8/2016 17:45	185.1
10/8/2016 17:45	185.0
10/8/2016 17:45	185.0
10/8/2016 17:45	184.9
10/8/2016 17:46	184.8
10/8/2016 17:46	184.8
10/8/2016 17:46	184.7
10/8/2016 17:46	184.7
10/8/2016 17:46	184.6
10/8/2016 17:47	184.6
10/8/2016 17:47	184.5
10/8/2016 17:47	184.5
10/8/2016 17:47	184.4
10/8/2016 17:47	184.4
10/8/2016 17:48	184.3
10/8/2016 17:48	184.3
10/8/2016 17:48	184.2
10/8/2016 17:48	184.2
10/8/2016 17:48	184.2
10/8/2016 17:48	184.2
10/8/2016 17:49	184.2
10/8/2016 17:49	184.1
10/8/2016 17:49	184.1
10/8/2016 17:49	184.1

Test 2: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 17:49	184.1
10/8/2016 17:49	184.0
10/8/2016 17:50	184.0
10/8/2016 17:50	184.0
10/8/2016 17:50	184.0
10/8/2016 17:50	184.0
10/8/2016 17:50	184.0
10/8/2016 17:50	184.0
10/8/2016 17:50	184.1
10/8/2016 17:51	184.1
10/8/2016 17:51	184.1
10/8/2016 17:51	184.0
10/8/2016 17:51	184.1
10/8/2016 17:51	184.1
10/8/2016 17:51	184.1
10/8/2016 17:52	184.1
10/8/2016 17:52	184.2
10/8/2016 17:52	184.2
10/8/2016 17:52	184.2
10/8/2016 17:53	184.3
10/8/2016 17:53	184.2
10/8/2016 17:53	184.2
10/8/2016 17:53	184.2
10/8/2016 17:53	184.2
10/8/2016 17:53	184.2
10/8/2016 17:54	184.2
10/8/2016 17:54	184.2
10/8/2016 17:54	184.2
10/8/2016 17:54	184.2
10/8/2016 17:54	184.2
RUN 2 AVERAGE	182.9

Test 3: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 18:51	173.9
10/8/2016 18:51	174.2
10/8/2016 18:51	174.5
10/8/2016 18:51	174.8
10/8/2016 18:51	175.1
10/8/2016 18:51	175.4
10/8/2016 18:52	175.6
10/8/2016 18:52	175.9
10/8/2016 18:52	176.2
10/8/2016 18:52	176.5
10/8/2016 18:52	176.8
10/8/2016 18:52	177.1
10/8/2016 18:53	177.4
10/8/2016 18:53	177.7
10/8/2016 18:53	177.9
10/8/2016 18:53	178.2
10/8/2016 18:53	178.4
10/8/2016 18:53	178.7
10/8/2016 18:54	179.0
10/8/2016 18:54	179.1
10/8/2016 18:54	179.4
10/8/2016 18:54	179.6
10/8/2016 18:54	179.8
10/8/2016 18:54	180.0
10/8/2016 18:55	180.2
10/8/2016 18:55	180.5
10/8/2016 18:55	180.7
10/8/2016 18:55	180.9
10/8/2016 18:55	180.9
10/8/2016 18:55	181.2
10/8/2016 18:56	181.4
10/8/2016 18:56	181.6
10/8/2016 18:56	181.7
10/8/2016 18:56	181.9
10/8/2016 18:56	182.1
10/8/2016 18:56	182.2
10/8/2016 18:57	182.4
10/8/2016 18:57	182.5
10/8/2016 18:57	182.6
10/8/2016 18:57	182.8
10/8/2016 18:57	182.9

Test 3: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 18:57	183.0
10/8/2016 18:58	183.1
10/8/2016 18:58	183.2
10/8/2016 18:58	183.3
10/8/2016 18:58	183.5
10/8/2016 18:58	183.5
10/8/2016 18:58	183.7
10/8/2016 18:59	183.8
10/8/2016 18:59	183.8
10/8/2016 18:59	184.0
10/8/2016 18:59	184.0
10/8/2016 18:59	184.1
10/8/2016 18:59	184.3
10/8/2016 19:00	184.4
10/8/2016 19:00	184.5
10/8/2016 19:00	184.5
10/8/2016 19:00	184.6
10/8/2016 19:00	184.7
10/8/2016 19:00	184.7
10/8/2016 19:01	184.7
10/8/2016 19:01	184.9
10/8/2016 19:01	184.9
10/8/2016 19:01	185.0
10/8/2016 19:01	185.1
10/8/2016 19:01	185.1
10/8/2016 19:02	185.2
10/8/2016 19:02	185.3
10/8/2016 19:02	185.3
10/8/2016 19:02	185.4
10/8/2016 19:02	185.4
10/8/2016 19:02	185.5
10/8/2016 19:03	185.5
10/8/2016 19:03	185.5
10/8/2016 19:03	185.6
10/8/2016 19:03	185.7
10/8/2016 19:03	185.7
10/8/2016 19:03	185.8
10/8/2016 19:04	185.8
10/8/2016 19:04	185.8
10/8/2016 19:04	185.9
10/8/2016 19:04	186.0

Test 3: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 19:04	186.0
10/8/2016 19:04	186.0
10/8/2016 19:05	186.1
10/8/2016 19:05	186.1
10/8/2016 19:05	186.2
10/8/2016 19:05	186.2
10/8/2016 19:05	186.3
10/8/2016 19:05	186.2
10/8/2016 19:06	186.3
10/8/2016 19:06	186.4
10/8/2016 19:06	186.4
10/8/2016 19:06	186.4
10/8/2016 19:06	186.4
10/8/2016 19:06	186.4
10/8/2016 19:06	186.4
10/8/2016 19:07	186.4
10/8/2016 19:07	186.4
10/8/2016 19:07	186.4
10/8/2016 19:07	186.4
10/8/2016 19:07	186.5
10/8/2016 19:08	186.4
10/8/2016 19:08	186.5
10/8/2016 19:08	186.4
10/8/2016 19:08	186.4
10/8/2016 19:08	186.4
10/8/2016 19:09	186.4
10/8/2016 19:09	186.4
10/8/2016 19:09	186.5
10/8/2016 19:09	186.4
10/8/2016 19:09	186.4
10/8/2016 19:10	186.4
10/8/2016 19:10	186.4
10/8/2016 19:10	186.4
10/8/2016 19:10	186.5
10/8/2016 19:10	186.4
10/8/2016 19:10	186.5
10/8/2016 19:11	186.5
10/8/2016 19:11	186.5
10/8/2016 19:11	186.5

Test 3: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 19:11	186.5
10/8/2016 19:11	186.5
10/8/2016 19:11	186.5
10/8/2016 19:12	186.6
10/8/2016 19:12	186.6
10/8/2016 19:12	186.6
10/8/2016 19:12	186.6
10/8/2016 19:12	186.6
10/8/2016 19:12	186.6
10/8/2016 19:12	186.6
10/8/2016 19:13	186.5
10/8/2016 19:13	186.6
10/8/2016 19:13	186.5
10/8/2016 19:13	186.5
10/8/2016 19:13	186.4
10/8/2016 19:14	186.4
10/8/2016 19:14	186.4
10/8/2016 19:14	186.4
10/8/2016 19:14	186.3
10/8/2016 19:14	186.2
10/8/2016 19:15	186.2
10/8/2016 19:15	186.1
10/8/2016 19:15	186.1
10/8/2016 19:15	186.0
10/8/2016 19:15	185.9
10/8/2016 19:15	185.8
10/8/2016 19:16	185.8
10/8/2016 19:16	185.7
10/8/2016 19:16	185.5
10/8/2016 19:16	185.4
10/8/2016 19:16	185.3
10/8/2016 19:16	185.1
10/8/2016 19:17	185.0
10/8/2016 19:17	184.8
10/8/2016 19:17	184.6
10/8/2016 19:17	184.5
10/8/2016 19:17	184.3
10/8/2016 19:17	184.0
10/8/2016 19:18	183.8
10/8/2016 19:18	183.6

Test 3: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 19:18	183.4
10/8/2016 19:18	183.2
10/8/2016 19:18	183.0
10/8/2016 19:18	182.7
10/8/2016 19:19	182.4
10/8/2016 19:19	182.2
10/8/2016 19:19	181.9
10/8/2016 19:19	181.7
10/8/2016 19:19	181.4
10/8/2016 19:19	181.1
10/8/2016 19:20	180.8
10/8/2016 19:20	180.5
10/8/2016 19:20	180.2
10/8/2016 19:20	180.0
10/8/2016 19:20	179.7
10/8/2016 19:20	179.4
10/8/2016 19:21	179.2
10/8/2016 19:21	178.9
10/8/2016 19:21	178.7
10/8/2016 19:21	178.4
10/8/2016 19:21	178.2
10/8/2016 19:21	177.9
10/8/2016 19:22	177.7
10/8/2016 19:22	177.4
10/8/2016 19:22	177.2
10/8/2016 19:22	177.0
10/8/2016 19:22	176.8
10/8/2016 19:22	176.7
10/8/2016 19:23	176.5
10/8/2016 19:23	176.4
10/8/2016 19:23	176.1
10/8/2016 19:23	176.1
10/8/2016 19:23	175.9
10/8/2016 19:23	175.7
10/8/2016 19:24	175.6
10/8/2016 19:24	175.6
10/8/2016 19:24	175.4
10/8/2016 19:24	175.4
10/8/2016 19:24	175.3
10/8/2016 19:24	175.3
10/8/2016 19:25	175.3

Test 3: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 19:25	175.2
10/8/2016 19:25	175.2
10/8/2016 19:25	175.2
10/8/2016 19:25	175.3
10/8/2016 19:25	175.2
10/8/2016 19:26	175.3
10/8/2016 19:26	175.4
10/8/2016 19:26	175.4
10/8/2016 19:26	175.5
10/8/2016 19:26	175.6
10/8/2016 19:26	175.8
10/8/2016 19:27	175.9
10/8/2016 19:27	176.0
10/8/2016 19:27	176.1
10/8/2016 19:27	176.2
10/8/2016 19:27	176.4
10/8/2016 19:27	176.7
10/8/2016 19:28	176.8
10/8/2016 19:28	176.9
10/8/2016 19:28	177.1
10/8/2016 19:28	177.3
10/8/2016 19:28	177.4
10/8/2016 19:28	177.6
10/8/2016 19:29	177.8
10/8/2016 19:29	178.0
10/8/2016 19:29	178.2
10/8/2016 19:29	178.4
10/8/2016 19:29	178.5
10/8/2016 19:29	178.7
10/8/2016 19:30	178.9
10/8/2016 19:30	179.1
10/8/2016 19:30	179.3
10/8/2016 19:30	179.4
10/8/2016 19:30	179.6
10/8/2016 19:30	179.8
10/8/2016 19:31	180.0
10/8/2016 19:31	180.1
10/8/2016 19:31	180.3
10/8/2016 19:31	180.5
10/8/2016 19:31	180.7
10/8/2016 19:31	180.9

Test 3: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 19:32	181.0
10/8/2016 19:32	181.1
10/8/2016 19:32	181.4
10/8/2016 19:32	181.7
10/8/2016 19:32	181.8
10/8/2016 19:32	181.9
10/8/2016 19:33	182.1
10/8/2016 19:33	182.2
10/8/2016 19:33	182.4
10/8/2016 19:33	182.6
10/8/2016 19:33	182.7
10/8/2016 19:33	182.8
10/8/2016 19:34	183.0
10/8/2016 19:34	183.1
10/8/2016 19:34	183.2
10/8/2016 19:34	183.3
10/8/2016 19:34	183.4
10/8/2016 19:34	183.5
10/8/2016 19:35	183.6
10/8/2016 19:35	183.6
10/8/2016 19:35	183.7
10/8/2016 19:35	183.8
10/8/2016 19:35	183.8
10/8/2016 19:35	183.9
10/8/2016 19:36	184.0
10/8/2016 19:36	183.9
10/8/2016 19:36	184.0
10/8/2016 19:36	184.1
10/8/2016 19:36	184.0
10/8/2016 19:36	184.1
10/8/2016 19:37	184.1
10/8/2016 19:37	184.2
10/8/2016 19:37	184.2
10/8/2016 19:37	184.1
10/8/2016 19:37	184.0
10/8/2016 19:37	184.0
10/8/2016 19:38	184.0
10/8/2016 19:38	184.0
10/8/2016 19:38	183.9
10/8/2016 19:38	183.9
10/8/2016 19:38	183.7

Test 3: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 19:38	183.6
10/8/2016 19:39	183.5
10/8/2016 19:39	183.4
10/8/2016 19:39	183.2
10/8/2016 19:39	183.1
10/8/2016 19:39	183.0
10/8/2016 19:39	182.8
10/8/2016 19:40	182.7
10/8/2016 19:40	182.5
10/8/2016 19:40	182.3
10/8/2016 19:40	182.1
10/8/2016 19:40	181.9
10/8/2016 19:40	181.7
10/8/2016 19:41	181.6
10/8/2016 19:41	181.4
10/8/2016 19:41	181.1
10/8/2016 19:41	180.9
10/8/2016 19:41	180.6
10/8/2016 19:41	180.4
10/8/2016 19:42	180.2
10/8/2016 19:42	179.9
10/8/2016 19:42	179.7
10/8/2016 19:42	179.5
10/8/2016 19:42	179.3
10/8/2016 19:42	179.0
10/8/2016 19:43	178.9
10/8/2016 19:43	178.7
10/8/2016 19:43	178.5
10/8/2016 19:43	178.3
10/8/2016 19:43	178.0
10/8/2016 19:43	177.8
10/8/2016 19:44	177.6
10/8/2016 19:44	177.4
10/8/2016 19:44	177.3
10/8/2016 19:44	177.1
10/8/2016 19:44	177.0
10/8/2016 19:44	176.8
10/8/2016 19:45	176.7
10/8/2016 19:45	176.5
10/8/2016 19:45	176.4
10/8/2016 19:45	176.2

Test 3: Catalytic Oxidizer Temperature Data

Sterilizer Initial Performance Test

Covidien - North Haven, CT

Date and Time	Temperature (°C)
10/8/2016 19:45	176.1
10/8/2016 19:45	176.0
10/8/2016 19:46	175.9
10/8/2016 19:46	175.9
10/8/2016 19:46	175.8
10/8/2016 19:46	175.8
10/8/2016 19:46	175.7
10/8/2016 19:46	175.7
10/8/2016 19:47	175.8
10/8/2016 19:47	175.8
10/8/2016 19:47	175.8
10/8/2016 19:47	175.7
10/8/2016 19:47	175.8
10/8/2016 19:47	175.8
10/8/2016 19:48	175.9
10/8/2016 19:48	176.0
10/8/2016 19:48	176.0
10/8/2016 19:48	176.2
10/8/2016 19:48	176.2
10/8/2016 19:48	176.4
10/8/2016 19:49	176.4
10/8/2016 19:49	176.6
10/8/2016 19:49	176.7
10/8/2016 19:49	176.9
10/8/2016 19:49	177.0
10/8/2016 19:49	177.1
10/8/2016 19:50	177.3
10/8/2016 19:50	177.5
10/8/2016 19:50	177.7
10/8/2016 19:50	177.8
10/8/2016 19:50	178.0
10/8/2016 19:50	178.2
RUN 3 AVERAGE	181.4

APPENDIX H

PROCESS DATA

		Primary Aeration Exhaust Pressure PTICALH 80.672	Balancer Water Loop Temperature TTIC 30.610	Balancer Water Loop Pressure PSALH 30.672
Time	Run	mm WC	°C	bar
15:22	1	-5	17	1.5
15:23	1	-5	17	1.5
15:24	1	-5	17	1.5
15:25	1	-5	17	1.5
15:26	1	-5	16	1.5
15:27	1	-5	16	1.5
15:28	1	-5	16	1.5
15:29	1	-5	16	1.5
15:30	1	-5	16	1.5
15:31	1	-4.8	16	1.5
15:32	1	-5.3	16	1.5
15:33	1	-5.1	19	1.5
15:34	1	-5.6	19	1.5
15:35	1	-5.1	19	1.5
15:36	1	-5.1	19	1.5
15:37	1	-5.1	19	1.5
15:38	1	-4.9	19	1.5
15:39	1	-5.4	19	1.5
15:40	1	-5.2	19	1.5
15:41	1	-5.1	19	1.5
15:42	1	-5.1	19	1.5
15:43	1	-4.9	19	1.5
15:44	1	-4.6	19	1.5
15:45	1	-5	19	1.5
15:46	1	-5.5	19	1.5
15:47	1	-5.4	19	1.5
15:48	1	-5.2	19	1.5
15:49	1	-5	19	1.5
15:50	1	-4.9	19	1.5
15:51	1	-5	19	1.5
15:52	1	-4.8	19	1.5
15:53	1	-4.7	19	1.5
15:54	1	-4.9	19	1.5
15:55	1	-4.7	19	1.5
15:56	1	-4.9	19	1.5
15:57	1	-4.5	19	1.5
15:58	1	-5.7	19	1.5
15:59	1	-5.8	19	1.5
16:00	1	-5.2	19	1.5
16:01	1	-4.9	19	1.5
16:02	1	-5	19	1.5

		Primary Aeration Exhaust Pressure PTICALH 80.672	Balancer Water Loop Temperature TTIC 30.610	Balancer Water Loop Pressure PSALH 30.672
Time	Run	mm WC	°C	bar
16:03	1	-5.2	19	1.5
16:04	1	-5.4	19	1.5
16:05	1	-4.9	19	1.5
16:06	1	-4.8	19	1.5
16:07	1	-5.1	19	1.5
16:08	1	-4.9	19	1.5
16:09	1	-5.2	19	1.5
16:10	1	-5	19	1.5
16:11	1	-4.9	19	1.5
16:12	1	-5.6	19	1.5
16:13	1	-5.4	20	1.5
16:14	1	-5.3	20	1.5
16:15	1	-5	20	1.5
16:16	1	-5.3	20	1.5
16:17	1	-5.3	20	1.5
16:18	1	-5.8	20	1.5
16:19	1	-5.1	20	1.5
16:20	1	-4.4	20	1.5
16:21	1	-4.8	20	1.5
RUN 1 AVG		-5.08	18.7	1.5
16:54	2	-4.9	16	1.5
16:55	2	-4.8	16	1.5
16:56	2	-5.1	16	1.5
16:57	2	-4.9	16	1.5
16:58	2	-5	16	1.5
16:59	2	-5.1	16	1.5
17:00	2	-4.8	16	1.5
17:01	2	-4.8	16	1.5
17:02	2	-5.2	16	1.5
17:03	2	-5.1	16	1.5
17:04	2	-4.9	16	1.5
17:05	2	-4.7	16	1.5
17:06	2	-4.7	16	1.5
17:07	2	-4.8	16	1.5
17:08	2	-5.4	19	1.5
17:09	2	-5.3	19	1.5
17:10	2	-5.2	19	1.5
17:11	2	-5.4	19	1.5
17:12	2	-5.1	19	1.5
17:13	2	-5.2	19	1.5
17:14	2	-5.4	19	1.5

		Primary Aeration Exhaust Pressure PTICALH 80.672	Balancer Water Loop Temperature TTIC 30.610	Balancer Water Loop Pressure PSALH 30.672
Time	Run	mm WC	°C	bar
17:15	2	-4.8	19	1.5
17:16	2	-4.7	19	1.5
17:17	2	-4.9	19	1.5
17:18	2	-5.1	19	1.5
17:19	2	-5	19	1.4
17:20	2	-4.9	19	1.4
17:21	2	-5.1	19	1.4
17:22	2	-4.8	19	1.4
17:23	2	-4.9	19	1.4
17:24	2	-4.9	19	1.4
17:25	2	-5.3	19	1.4
17:26	2	-5.2	19	1.4
17:27	2	-4.6	20	1.4
17:28	2	-4.5	19	1.4
17:29	2	-4.7	20	1.4
17:30	2	-5.2	20	1.4
17:31	2	-5	20	1.4
17:32	2	-5.2	20	1.4
17:33	2	-4.9	20	1.4
17:34	2	-5	20	1.4
17:35	2	-4.7	20	1.4
17:36	2	-4.8	20	1.4
17:37	2	-4.8	20	1.4
17:38	2	-4.8	19	1.4
17:39	2	-5.1	19	1.4
17:40	2	-5.1	19	1.4
17:41	2	-5.2	19	1.4
17:42	2	-4.9	19	1.4
17:43	2	-4.8	19	1.4
17:44	2	-5	19	1.4
17:45	2	-5.1	19	1.4
17:46	2	-5.2	19	1.4
17:47	2	-5	19	1.4
17:48	2	-5.2	18	1.4
17:49	2	-5.3	18	1.4
17:50	2	-5.1	18	1.4
17:51	2	-5.2	17	1.4
17:52	2	-5.3	17	1.4
17:53	2	-5	17	1.4
17:54	2	-4.8	17	1.4
RUN 2 AVG		-5.00	18.3	1.4

		Primary Aeration Exhaust Pressure PTICALH 80.672	Balancer Water Loop Temperature TTIC 30.610	Balancer Water Loop Pressure PSALH 30.672
Time	Run	mm WC	°C	bar
18:50	3	-4.8	16	1.5
18:51	3	-4.7	16	1.5
18:52	3	-5	16	1.5
18:53	3	-4.8	16	1.5
18:54	3	-4.6	16	1.5
18:55	3	-5.3	16	1.5
18:56	3	-4.4	16	1.5
18:57	3	-6	16	1.5
18:58	3	-5.9	16	1.5
18:59	3	-5.2	16	1.5
19:00	3	-5.3	16	1.5
19:01	3	-5.1	16	1.5
19:02	3	-4.9	16	1.5
19:03	3	-4.6	16	1.5
19:04	3	-5.5	16	1.5
19:05	3	-4.6	16	1.5
19:06	3	-6.1	16	1.5
19:07	3	-2.9	17	1.5
19:08	3	-4.9	17	1.5
19:09	3	-4.9	17	1.5
19:10	3	-5.3	18	1.5
19:11	3	-4.7	18	1.5
19:12	3	-4.8	18	1.5
19:13	3	-5.1	18	1.5
19:14	3	-4.5	18	1.5
19:15	3	-5.1	18	1.5
19:16	3	-5.3	19	1.5
19:17	3	-4.5	19	1.5
19:19	3	-4.7	19	1.5
19:20	3	-5.1	19	1.5
19:21	3	-5.2	19	1.5
19:22	3	-5.1	19	1.5
19:23	3	-5.2	19	1.5
19:24	3	-5.5	19	1.5
19:25	3	-5	19	1.5
19:26	3	-5.2	19	1.5
19:27	3	-4.3	19	1.5
19:28	3	-4.2	19	1.5
19:29	3	-4.5	19	1.4
19:30	3	-3.6	19	1.5
19:31	3	-4.3	19	1.5

		Primary Aeration Exhaust Pressure PTICALH 80.672	Balancer Water Loop Temperature TTIC 30.610	Balancer Water Loop Pressure PSALH 30.672
Time	Run	mm WC	°C	bar
19:32	3	-3.5	19	1.5
19:33	3	-6	19	1.5
19:34	3	-6.3	19	1.5
19:35	3	-6.2	19	1.5
19:36	3	-6.6	19	1.5
19:37	3	-5.5	19	1.5
19:38	3	-4.9	19	1.5
19:39	3	-5	19	1.5
19:40	3	-5.1	19	1.5
19:41	3	-4.7	19	1.5
19:42	3	-4.9	19	1.5
19:43	3	-5.7	19	1.5
19:44	3	-5.1	19	1.5
19:45	3	-5.1	19	1.5
19:46	3	-5	19	1.5
19:47	3	-5.1	19	1.5
19:48	3	-5.1	19	1.5
19:49	3	-5.4	19	1.5
RUN 3 AVG		-5.02	17.9	1.5

Date Samples Received: 07/05/16

Client Name : Covidien, LP	CTL Lab No. : 0716025
Report Date : 07/19/16	PO/ Job No. : 20138457

RESULTS OF ANALYSIS

GC/FID-Direct Injection

Matrix Type :	W	W
CTL Sample No.:	10093	10095
Field ID :	LKV-1-EG	LKV-BK-EG
	07/01/16	07/01/16

Parameters	RL	Date Analyzed		
Ethylene Glycol-mg/L	10	ND	ND	07/08/16

EPA Method 8260B

Matrix Type :	W
CTL Sample No.:	10094
Field ID :	LKV-2-EO
	07/01/16

Parameters	RL	Date Analyzed		
Ethylene Oxide-ug/L *	100	ND		07/11/16

*This analysis was performed by Summit Environmental Technologies, Inc., PH-0105

RL= Reporting Limit ND= Not Detected

Matrix Type: W= Water/Aqueous S= Soil/Solid O= Oil/Hydrocarbon

Connecticut Testing Laboratories, Inc.
165 Gracey Avenue / Meriden, CT 06451
(203) 634-3731 (Fax) 630-1336
Certification CT-PH0547/ MA-CT035

Date Samples Received: 07/05/16

Client Name : Covidien, LP	CTL Lab No. : 0716025
Report Date : 07/19/16	PO/ Job No. : 20138457

QUALITY CONTROL DATA

GC/FID-Direct Injection

Parameters	RL	Method	LCS	LCS
		Blank	Conc.	Results
Ethylene Glycol-mg/L	10	ND	100	98

EPA Method 8260B

Parameters	RL	Method	LCS	LCS
		Blank	Conc.	Results
Ethylene Oxide-ug/L *	100	ND	1,000	1,130

*This analysis was performed by Summit Environmental Technologies, Inc., PH-0105

RL= Reporting Limit **ND**= Not Detected

LCS = Laboratory Control Sample

Connecticut Testing Laboratories, Inc.
165 Gracey Avenue / Meriden, CT 06451
(203) 634-3731 (Fax) 630-1336
Certification CT-PH0547/ MA-CT035

Clinical Product Runs

Process Summary

```
*****
* COVIDIEN *
* ****
```

CHAMBER 103369-3

DATE: 08/09/2016
TIME: 1:25:27 PM

CYCLE NUMBER: 310 Last Modification Date/Time: 4/28/2016 1:12:20 PM
CYCLE COUNTER NUMBER: 00000492

LOAD NUMBER 1: ZB600344
LOAD NUMBER 2: 501503
LOAD NUMBER 3: BATCH # 6189007NH
LOAD NUMBER 4:
LOAD NUMBER 5:
LOAD NUMBER 6:

OPERATOR ID NUMBER: 00003365

CYCLE TYPE	:	Eto
Test Vacuum	:	Yes
Nitrogen Blanket	:	Yes
Gas Makeup	:	N2
Aeration	:	No

TEMPERATURE UNIT : °F
PRESSURE UNIT : ''HgA
WEIGHT UNIT : Lbs.

PHASE 01 STANDBY

Jacket Temperature	:	105.0 °F
Jacket Offset	:	5.0 °F
Jacket Start Differential	:	5.0 °F
Chamber Temperature	:	100.0 °F
Chamber High Temperature Alarm	:	10.0 °F
Chamber High Temperature Warning	:	8.0 °F
Chamber Low Temperature Alarm	:	12.0 °F
Chamber Low Temperature Warning	:	7.0 °F
Vaporizer Temperature	:	130.0 °F
Vaporizer High Temperature Alarm	:	20.0 °F
Vaporizer High Temperature Warning	:	10.0 °F
Vaporizer High Temperature Warning	:	130.0 °F
Preheater Temperature	:	20.0 °F
Preheater High Temperature Alarm	:	10.0 °F
Pounds of Eto To Start	:	50.0 lbs.
Abort Temperature	:	140.0 °F
Abort Pressure	:	36.0 ''HgA
Diff Temp	:	3.0 °F
Steam Valve Duty Cycle	:	2.0 %
Internal Recirculation	:	YES
Door Crack Time	:	00:10:00

Appendix H

PHASE 02 INITIAL EVACUATION(1)

Jacket Temperature	:	105.0 °F	Rate Control:Use Rate Control
Jacket Offset	:	5.0 °F	:
Chamber Temperature	:	100.0 °F	:
Chamber High Temperature Alarm	:	10.0 °F	:
Chamber High Temperature Warning	:	8.0 °F	:
Chamber Low Temperature Alarm	:	12.0 °F	:
Chamber Low Temperature Warning	:	7.0 °F	:
Vaporizer Temperature	:	130.0 °F	:
Vaporizer High Temperature Alarm	:	18.0 °F	:
Vaporizer High Temperature Warning	:	9.0 °F	:
Vaporizer Low Temperature Alarm	:	18.0 °F	:
Vaporizer Low Temperature Warning	:	9.0 °F	:
Preheater Temperature	:	130.0 °F	:
Preheater High Temperature Alarm	:	20.0 °F	:
Preheater High Temperature Warning	:	10.0 °F	:
Preheater Low Temperature Alarm	:	20.0 °F	:
Preheater Low Temperature Warning	:	10.0 °F	:
Initial Evacuation Level	:	2.0 ''HgA	:
Evacuation Pressure Reduction Per Minute	:	1.5 ''HgA	:
Evacuation Fast Increment Alarm	:	0.8 ''HgA	:
Evacuation Slow Increment Alarm	:	0.8 ''HgA	:
Evacuation Slow Rate Stop Level	:	5.0 ''HgA	:
Print Interval	:	00:01:00	:
Maximum Phase Time	:	01:00:00	:

Performance Test

Appendix H

```

Chamber Temperature : 100.0 °F
Chamber High Temperature Alarm
Chamber High Temperature Warning : 8.0 °F
Chamber Low Temperature Alarm : 12.0 °F
Chamber Low Temperature Warning : 7.0 °F
Vaporizer Temperature : 130.0 °F
Vaporizer High Temperature Alarm : 20.0 °F
Vaporizer High Temperature Warning : 10.0 °F
Vaporizer Low Temperature Alarm : 20.0 °F
Vaporizer Low Temperature Warning : 10.0 °F
Preheater Temperature : 130.0 °F
Preheater High Temperature Alarm : 20.0 °F
Preheater High Temperature Warning : 10.0 °F
Preheater Low Temperature Alarm : 20.0 °F
Preheater Low Temperature Warning : 10.0 °F
Internal Recirculation
Phase Time : YES
Print Interval : 00:01:00

INITIAL N2 WASH(1) Rate Control:Use Rate Control
Jacket Temperature : 105.0 °F
Jacket Offset : 5.0 °F
Chamber Temperature : 100.0 °F
Chamber High Temperature Alarm : 10.0 °F
Chamber High Temperature Warning : 8.0 °F
Chamber Low Temperature Alarm : 12.0 °F
Chamber Low Temperature Warning : 7.0 °F
Vaporizer Temperature : 130.0 °F
Vaporizer High Temperature Alarm : 20.0 °F
Vaporizer High Temperature Warning : 10.0 °F
Vaporizer Low Temperature Alarm : 20.0 °F
Vaporizer Low Temperature Warning : 10.0 °F
Preheater Temperature : 130.0 °F
Preheater High Temperature Alarm : 20.0 °F
Preheater High Temperature Warning : 10.0 °F
Preheater Low Temperature Alarm : 20.0 °F
Preheater Low Temperature Warning : 10.0 °F
Vacuum Leak Level Alarm
Internal Recirculation
Phase Time : YES
Print Interval : 00:01:00

PHASE 06 INITIAL EVACUATION(2) Rate Control:Use Rate Control
Jacket Temperature : 105.0 °F
Jacket Offset : 5.0 °F
Chamber Temperature : 100.0 °F
Chamber High Temperature Alarm : 10.0 °F
Chamber High Temperature Warning : 8.0 °F
Chamber Low Temperature Alarm : 12.0 °F
Chamber Low Temperature Warning : 7.0 °F
Vaporizer Temperature : 130.0 °F
Vaporizer High Temperature Alarm : 20.0 °F
Vaporizer High Temperature Warning : 10.0 °F
Vaporizer Low Temperature Alarm : 20.0 °F
Vaporizer Low Temperature Warning : 10.0 °F
Preheater Temperature : 130.0 °F
Preheater High Temperature Alarm : 20.0 °F
Preheater High Temperature Warning : 10.0 °F
Preheater Low Temperature Alarm : 20.0 °F
Preheater Low Temperature Warning : 10.0 °F
Initial N2 Wash Level
Injection Pressure Increment Per Minute : 1.0 ''HgA
Injection Fast Increment Alarm : 0.8 ''HgA
Injection Slow Increment Alarm : 0.8 ''HgA
Internal Recirculation : YES
Maximum Phase Time : 00:30:00
Print Interval : 00:01:00
Maximum Phase Time : 00:01:00
Final Pressure Minimum Level : 11.5 ''HgA
Final Pressure Maximum Level : 12.5 ''HgA
Phase Time Minimum : 00:05:00
Phase Time Maximum : 00:30:00

```

Performance Test

Appendix H

		Phase Time Maximum	:	00:30:00
PHASE 07	HUMIDIFICATION(1)	Humidity Control;Pressure Control	:	
	Jacket Offset	: 5.0 °F	:	
	Chamber Temperature	: 100.0 °F	:	
	Chamber High Temperature Alarm	: 10.0 °F	:	
	Chamber: High Temperature Warning	: 8.0 °F	:	
	Chamber Low Temperature Alarm	: 12.0 °F	:	
	Chamber Low Temperature Warning	: 7.0 °F	:	
	Vaporizer Temperature	: 130.0 °F	:	
	Vaporizer High Temperature Alarm	: 20.0 °F	:	
	Vaporizer High Temperature Warning	: 10.0 °F	:	
	Vaporizer Low Temperature Alarm	: 20.0 °F	:	
	Vaporizer Low Temperature Warning	: 10.0 °F	:	
	Preheater Temperature	: 130.0 °F	:	
	Preheater High Temperature Alarm	: 20.0 °F	:	
	Preheater High Temperature Warning	: 10.0 °F	:	
	Preheater Low Temperature Alarm	: 20.0 °F	:	
	Preheater Low Temperature Warning	: 10.0 °F	:	
	Humidity Level	: 2.9 ''HgA	:	
	Internal Recirculation	: YES	:	
	Maximum Phase Time	: 01:00:00	:	
	Print Interval	: 00:01:00	:	
	End Humidity Low Limit	: 22.7 mg/l	:	
	End Humidity High Limit	: 66.6 mg/l	:	
	Cycle Time to Event Minimum	: 01:00:00	:	
	Cycle Time to Event Maximum	: 01:30:00	:	
PHASE 09	INITIAL EVACUATION(3)	Rate Control;Use Rate Control	:	
	Jacket Temperature	: 105.0 °F	:	
	Jacket Offset	: 5.0 °F	:	
	Chamber Temperature	: 100.0 °F	:	
	Chamber High Temperature Alarm	: 10.0 °F	:	
	Chamber High Temperature Warning	: 8.0 °F	:	
	Chamber Low Temperature Alarm	: 12.0 °F	:	
	Chamber Low Temperature Warning	: 7.0 °F	:	
	Vaporizer Temperature	: 130.0 °F	:	
	Vaporizer High Temperature Alarm	: 20.0 °F	:	
	Vaporizer High Temperature Warning	: 10.0 °F	:	
	Vaporizer Low Temperature Alarm	: 20.0 °F	:	
	Vaporizer Low Temperature Warning	: 10.0 °F	:	
	Preheater Temperature	: 130.0 °F	:	
	Preheater High Temperature Alarm	: 20.0 °F	:	
	Preheater High Temperature Warning	: 10.0 °F	:	
	Preheater Low Temperature Alarm	: 20.0 °F	:	
	Preheater Low Temperature Warning	: 10.0 °F	:	
	Initial Evacuation Level	: 2.0 ''HgA	:	
	Evacuation Pressure Reduction Per Minute	: 1.5 ''HgA	:	
	Evacuation Fast Increment Alarm	: 0.8 ''HgA	:	
	Evacuation Slow Increment Alarm	: 0.8 ''HgA	:	
	Evacuation Slow Rate Stop Level	: 5.0 ''HgA	:	
	Print Interval	: 00:01:00	:	
	Maximum Phase Time	: 00:15:00	:	
	Internal Recirculation	: YES	:	
	Final Pressure Minimum Level	: 4.5 ''HgA	:	
	Final Pressure Maximum Level	: 5.5 ''HgA	:	
	Phase Time Minimum	: 00:00:01	:	
PHASE 08	HUMIDIFICATION DWELL(1)	Humidity Control;Pressure Control	:	
	Jacket Offset	: 5.0 °F	:	
	Chamber Temperature	: 100.0 °F	:	
	Chamber High Temperature Alarm	: 10.0 °F	:	
	Chamber High Temperature Warning	: 8.0 °F	:	
	Chamber Low Temperature Alarm	: 12.0 °F	:	
	Chamber Low Temperature Warning	: 7.0 °F	:	
	Vaporizer Temperature	: 130.0 °F	:	
	Vaporizer High Temperature Alarm	: 20.0 °F	:	
	Vaporizer High Temperature Warning	: 10.0 °F	:	
	Vaporizer Low Temperature Alarm	: 20.0 °F	:	
	Vaporizer Low Temperature Warning	: 10.0 °F	:	
	Preheater Temperature	: 130.0 °F	:	
	Preheater High Temperature Alarm	: 20.0 °F	:	
	Preheater High Temperature Warning	: 10.0 °F	:	
	Preheater Low Temperature Alarm	: 20.0 °F	:	
	Preheater Low Temperature Warning	: 10.0 °F	:	
	Initial N2 Wash Level	: 5.3 ''HgA	:	
	Injection Pressure Increment Per Minute	: 1.5 ''HgA	:	
	Injection Fast Increment Alarm	: 0.8 ''HgA	:	
	Injection Slow Increment Alarm	: 0.8 ''HgA	:	
	Internal Recirculation	: YES	:	
	Maximum Phase Time	: 00:15:00	:	
	Print Interval	: 00:01:00	:	
	Final Pressure Minimum Level	: 4.5 ''HgA	:	
	Final Pressure Maximum Level	: 5.5 ''HgA	:	
	Phase Time Minimum	: 00:00:01	:	

Performance Test

Appendix H

		Phase Time Maximum	Phase Time Minimum
PHASE 11	STERILANT INJECTION(1)	Rate Control:Use Rate Control	: 00:00:01 : 00:15:00
Jacket Offset		: 5.0 °F	
Chamber Temperature		: 100.0 °F	
Chamber High Temperature Alarm		: 10.0 °F	
Chamber High Temperature Warning		: 8.0 °F	
Chamber Low Temperature Alarm		: 12.0 °F	
Chamber Low Temperature Warning		: 7.0 °F	
Vaporizer Temperature		: 130.0 °F	
Vaporizer High Temperature Alarm		: 20.0 °F	
Vaporizer High Temperature Warning		: 10.0 °F	
Vaporizer Low Temperature Alarm		: 20.0 °F	
Vaporizer Low Temperature Warning		: 10.0 °F	
Preheater Temperature		: 130.0 °F	
Preheater High Temperature Alarm		: 20.0 °F	
Preheater High Temperature Warning		: 10.0 °F	
Preheater Low Temperature Alarm		: 20.0 °F	
Preheater Low Temperature Warning		: 10.0 °F	
Preheater Low Temperature Warning		: 10.0 °F	
Sterilant Pressure		: 13.6 ''HgA	
Injection Pressure Increment Per Minute		: 0.4 ''HgA	
Injection Fast Increment Alarm		: 0.7 ''HgA	
Injection Slow Increment Alarm		: 0.7 ''HgA	
Internal Recirculation		: YES	
Maximum Phase Time		: 01:00:00	
Print Interval		: 00:01:00	
Final Pressure Minimum Level		: 13.3 ''HgA	
Final Pressure Maximum Level		: 14.3 ''HgA	
Phase Time Minimum		: 00:05:00	
Phase Time Maximum		: 01:00:00	
Gas Used Minimum Weight		: 15.0 lbs.	
Gas Used Maximum Weight		: 40.0 lbs.	
		Phase Time Maximum	Phase Time Minimum
PHASE 12	N2 BLANKET(1)	Rate Control:Use Rate Control	: 00:15:00
Jacket Offset		: 5.0 °F	
Chamber Temperature		: 100.0 °F	
Chamber High Temperature Alarm		: 10.0 °F	
Chamber High Temperature Warning		: 8.0 °F	
Chamber Low Temperature Alarm		: 12.0 °F	
Chamber Low Temperature Warning		: 7.0 °F	
Vaporizer Temperature		: 130.0 °F	
Vaporizer High Temperature Alarm		: 20.0 °F	
Vaporizer High Temperature Warning		: 10.0 °F	
Vaporizer Low Temperature Alarm		: 20.0 °F	
Vaporizer Low Temperature Warning		: 10.0 °F	
Preheater Temperature		: 20.0 °F	
Preheater High Temperature Alarm		: 20.0 °F	
Preheater Low Temperature Alarm		: 20.0 °F	
Preheater Low Temperature Warning		: 10.0 °F	
Nitrogen Blanket Pressure		: 26.3 ''HgA	
Injection Pressure Increment Per Minute		: 0.4 ''HgA	
Injection Fast Increment Alarm		: 0.7 ''HgA	
Injection Slow Increment Alarm		: 0.7 ''HgA	
Internal Recirculation		: YES	
Maximum Phase Time		: 01:00:00	
Print Interval		: 00:01:00	
Final Pressure Minimum Level		: 25.5 ''HgA	
Final Pressure Maximum Level		: 27.0 ''HgA	
Phase Time Minimum		: 00:05:00	
Phase Time Maximum		: 01:00:00	
		Phase Time Maximum	Phase Time Minimum
PHASE 13	EXPOSURE(1)	Rate Control:Use Rate Control	: 00:15:00
Jacket Offset		: 5.0 °F	
Chamber Temperature		: 100.0 °F	
Chamber High Temperature Alarm		: 10.0 °F	
Chamber High Temperature Warning		: 8.0 °F	
Chamber Low Temperature Alarm		: 12.0 °F	
Chamber Low Temperature Warning		: 7.0 °F	
Vaporizer Temperature		: 130.0 °F	
Vaporizer High Temperature Alarm		: 20.0 °F	
Vaporizer High Temperature Warning		: 10.0 °F	
Vaporizer Low Temperature Alarm		: 20.0 °F	
Vaporizer Low Temperature Warning		: 10.0 °F	
Vaporizer Low Temperature Warning		: 10.0 °F	
Preheater Temperature		: 130.0 °F	
Preheater High Temperature Alarm		: 20.0 °F	
Preheater High Temperature Warning		: 10.0 °F	
Preheater Low Temperature Alarm		: 20.0 °F	
Preheater Low Temperature Alarm		: 20.0 °F	
Preheater Low Temperature Warning		: 10.0 °F	
Gas Makeup Differential Pressure		: 0.5 ''HgA	
Maximum Gas Makeups		: 0.5 ''HgA	
Exposure Pressure Offset		: 0.5 ''HgA	
High Pressure Warning		: 0.6 ''HgA	
Low Pressure Warning		: 0.8 ''HgA	
High Pressure Alarm		: 0.8 ''HgA	
Low Pressure Alarm		: 0.8 ''HgA	

Performance Test

Appendix H

Internal Recirculation	:	YES
Phase Time	:	01:00:00
Print Interval	:	00:01:00
Minimum Pressure Level	:	25.5 ''HgA
Maximum Pressure Level	:	27.0 ''HgA
Low Temperature Minimum	:	90.0 °F
High Temperature Maximum	:	110.0 °F
Low Gas Concentration Minimum	:	300.0 mg/l
High Gas Concentration Maximum	:	650.0 mg/l
Phase Time Minimum	:	01:00:00
Phase Time Maximum	:	01:15:00
Time In Specification Minimum	:	01:00:00
Time In Specification Maximum	:	01:15:00
PHASE 15 STERILANT REMOVAL Rate Control:Use Rate Control	:	
Jacket Temperature	:	100.0 °F
Jacket Offset	:	5.0 °F
Chamber Temperature	:	93.0 °F
Chamber High Temperature Alarm	:	17.0 °F
Chamber High Temperature Warning	:	12.0 °F
Chamber Low Temperature Alarm	:	13.0 °F
Chamber Low Temperature Warning	:	8.0 °F
Vaporizer Temperature	:	130.0 °F
Vaporizer High Temperature Alarm	:	20.0 °F
Vaporizer High Temperature Warning	:	10.0 °F
Vaporizer Low Temperature Alarm	:	20.0 °F
Vaporizer Low Temperature Warning	:	10.0 °F
Preheater Temperature	:	130.0 °F
Preheater High Temperature Alarm	:	20.0 °F
Preheater High Temperature Warning	:	10.0 °F
Preheater Low Temperature Alarm	:	20.0 °F
Preheater Low Temperature Warning	:	10.0 °F
Sterilant Removal Vacuum Level	:	5.0 ''HgA
Evacuation Pressure Reduction Per Minute	:	0.8 ''HgA
Evacuation Fast Increment Alarm	:	0.7 ''HgA
Evacuation Slow Increment Alarm	:	0.7 ''HgA
Evacuation Stop Rate Stop Level	:	7.0 ''HgA
Print Interval	:	00:01:00
Maximum Phase Time	:	01:30:00
Internal Recirculation	:	YES
Final Pressure Minimum Level	:	4.5 ''HgA
Final Pressure Maximum Level	:	5.5 ''HgA
Phase Time Minimum	:	00:15:00
Phase Time Maximum	:	01:30:00
PHASE 16 POST N2 WASH(1) Rate Control:Use Rate Control	:	
Jacket Temperature	:	100.0 °F
Jacket Offset	:	5.0 °F
Chamber Temperature	:	93.0 °F
Chamber High Temperature Alarm	:	17.0 °F
Chamber High Temperature Warning	:	12.0 °F
Chamber Low Temperature Alarm	:	13.0 °F
Chamber Low Temperature Warning	:	8.0 °F
Vaporizer Temperature	:	130.0 °F
Vaporizer High Temperature Alarm	:	20.0 °F
Vaporizer High Temperature Warning	:	10.0 °F
Vaporizer Low Temperature Alarm	:	20.0 °F
Vaporizer Low Temperature Warning	:	10.0 °F
Preheater Temperature	:	130.0 °F
Preheater High Temperature Alarm	:	20.0 °F
Preheater High Temperature Warning	:	10.0 °F
Preheater Low Temperature Alarm	:	20.0 °F
Preheater Low Temperature Warning	:	10.0 °F
Post N2 Wash Level	:	28.5 ''HgA
Injection Pressure Increment Per Minute	:	1.4 ''HgA
Injection Fast Increment Alarm	:	0.8 ''HgA
Injection Slow Increment Alarm	:	0.8 ''HgA
Print Interval	:	00:01:00
Maximum Phase Time	:	00:45:00
Internal Recirculation	:	YES
Final Pressure Minimum Level	:	28.0 ''HgA
Final Pressure Maximum Level	:	29.0 ''HgA
Phase Time Minimum	:	00:15:00
Phase Time Maximum	:	00:45:00
PHASE 17 POST EVACUATION(1) Rate Control:Use Rate Control	:	
Jacket Temperature	:	100.0 °F
Jacket Offset	:	5.0 °F
Chamber Temperature	:	93.0 °F
Chamber High Temperature Alarm	:	17.0 °F
Chamber High Temperature Warning	:	12.0 °F
Chamber Low Temperature Alarm	:	13.0 °F
Chamber Low Temperature Warning	:	8.0 °F
Injection Pressure Increment Per Minute	:	1.5 ''HgA
Injection Fast Increment Alarm	:	0.8 ''HgA
Injection Slow Increment Alarm	:	0.8 ''HgA
Internal Recirculation	:	YES
Maximum Phase Time	:	00:45:00
Internal Recirculation	:	
Phase Time Maximum	:	
PHASE 18 AIR BACKWASH(1) (Loop 1 Count:7) Rate Control:Use Rate Control	:	
Jacket Temperature	:	100.0 °F
Jacket Offset	:	5.0 °F
Chamber Temperature	:	93.0 °F
Chamber High Temperature Alarm	:	17.0 °F
Chamber High Temperature Warning	:	12.0 °F
Chamber Low Temperature Alarm	:	13.0 °F
Chamber Low Temperature Warning	:	8.0 °F
Injection Pressure Increment Per Minute	:	1.5 ''HgA
Injection Fast Increment Alarm	:	0.8 ''HgA
Injection Slow Increment Alarm	:	0.8 ''HgA
Internal Recirculation	:	YES
Maximum Phase Time	:	00:45:00

Performance Test Appendix H

PHASE 19	POST EVACUATION(2) (Loop:1 Count:7)	Rate Control:Use Rate Control	Print Interval
Jacket Temperature	: 100.0 °F	Jacket Temperature	: 100.0 °F
Jacket Offset	: 5.0 °F	Jacket Offset	: 5.0 °F
Chamber Temperature	: 93.0 °F	Chamber Temperature	: 93.0 °F
Chamber High Temperature Alarm	: 17.0 °F	Chamber High Temperature Alarm	: 17.0 °F
Chamber High Temperature Warning	: 12.0 °F	Chamber High Temperature Warning	: 12.0 °F
Chamber Low Temperature Alarm	: 13.0 °F	Chamber Low Temperature Alarm	: 13.0 °F
Chamber Low Temperature Warning	: 8.0 °F	Chamber Low Temperature Warning	: 8.0 °F
Vaporizer Temperature	: 130.0 °F	Injection Pressure Increment Per Minute	: 1.5 ''HgA
Vaporizer High Temperature Alarm	: 20.0 °F	Injection Fast Increment Alarm	: 0.8 ''HgA
Vaporizer High Temperature Warning	: 10.0 °F	Injection Slow Increment Alarm	: 0.8 ''HgA
Vaporizer Low Temperature Alarm	: 20.0 °F	Internal Recirculation	: YES
Vaporizer Low Temperature Warning	: 10.0 °F	Maximum Phase Time	: 00:45:00
Preheater Temperature	: 130.0 °F	Print Interval	: 00:01:00
Preheater High Temperature Alarm	: 20.0 °F	Final Pressure Minimum Level	: 28.0 ''HgA
Preheater High Temperature Warning	: 10.0 °F	Final Pressure Maximum Level	: 29.5 ''HgA
Preheater Low Temperature Alarm	: 20.0 °F	Phase Time Minimum	: 00:15:00
Preheater Low Temperature Warning	: 10.0 °F	Phase Time Maximum	: 00:45:00
Post Evacuation Level	: 2.0 ''HgA		
Evacuation Pressure Reduction Per Minute	: 1.5 ''HgA		
Evacuation Fast Increment Alarm	: 0.8 ''HgA		
Evacuation Slow Increment Alarm	: 0.8 ''HgA		
Evacuation Slow Rate Stop Level	: 5.0 ''HgA		
Print Interval	: 00:02:00		
Maximum Phase Time	: 00:45:00		
Internal Recirculation	: YES		
Final Pressure Minimum Level	: 1.5 ''HgA		
Final Pressure Maximum level	: 2.5 ''HgA		
Phase Time Minimum	: 00:15:00		
Phase Time Maximum	: 00:45:00		
PHASE 21	END OF CYCLE		
Jacket Temperature	: 105.0 °F		
Jacket Offset	: 5.0 °F		
Internal Recirculation	: YES		

POST EVACUATION(2)		Loop:7/7)		SUMMARY		8/10/2016 9:31:26 AM		PXRTR VAP GAS		MNFLD MNTR EO		EO GAS		EO GAS		
CYCLE	PHASE	PX-1	PX-4	CH	CH1	CH2	CH3	CHIA	CH2A	CH3A	JR	JS	PXRTR VAP GAS	MNFLD MNTR EO	EO GAS	
TIME	TIME	PRESS	PRESS	HUMID	HUMID	HUMID	HUMID	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	
HH:MM:SS	HH:MM:SS	('HgA)	('HgA)	(%RH)	(%RH)	(%RH)	(%RH)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	
20:17:14	00:20:01	3.2	-0.1	-0.3	99.1	98.3	99.9	99.2	98.6	99.6	97.9	99.5	10.3	132.9	131.1	
20:19:14	00:22:01	2.2	-0.2	-0.4	99.3	98.5	100.2	99.3	98.7	99.8	98.0	99.8	10.8	132.8	130.9	
20:19:42	00:22:29	2.0	2.0	2.0	99.4	98.6	100.3	99.4	98.7	99.8	98.0	99.5	10.0	132.6	130.9	
START PRESS:	29.3	MAX PRESS:	29.4	MIN PRESS:	2.0	MIN TEMP:	97.9	DRM1 START:	292.7	DRM2 START:	686.5	MAX PRE TEMP:	133.5	MIN GAS TEMP:	83.1	
END PRESS:	2.0	ETO USED 1:	0.0	ETO USED 2:	0.0	ETO USED CYCLE:	18.8	ETO USED PHASE:	0.0	ETO USED 1:	0.0	ETO USED 2:	0.0	ETO USED CYCLE:	18.8	
PRESS CHANGE:	27.3	ETO USED PHASE:	0.0	ETO USED CYCLE:	18.8	ETO USED PHASE:	0.0	ETO USED CYCLE:	18.8	ETO USED PHASE:	0.0	ETO USED CYCLE:	18.8	ETO USED PHASE:	0.0	
AIR BACKFILL(2)		8/10/2016 9:31:26 AM		CALC. AVG.		CH1		CH2		CH3		CHIA		CH2A		
CYCLE	PHASE	PX-1	PX-2	PX-4	CH	CH1	CH2	CH3	CHIA	CH2A	CH3A	JR	JS	PXRTR VAP GAS	MNFLD MNTR EO	EO GAS
TIME	TIME	PRESS	PRESS	PRESS	HUMID	HUMID	HUMID	HUMID	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP
HH:MM:SS	HH:MM:SS	('HgA)	('HgA)	('HgA)	(%RH)	(%RH)	(%RH)	(%RH)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
20:19:42	00:00:00	2.0	2.0	2.0	-0.2	99.4	98.6	100.3	99.4	98.7	99.8	99.5	10.0	132.6	130.9	
20:20:42	00:01:00	3.5	3.5	3.5	1.6	99.8	99.0	100.6	99.9	99.3	100.2	98.5	10.1	132.7	130.8	
20:21:42	00:02:00	4.7	4.6	3.0.2	1.6	100.3	99.5	101.0	100.5	99.8	100.5	99.0	10.2	132.7	130.7	
20:22:42	00:03:00	6.7	6.1	30.2	1.6	100.7	99.9	101.3	100.9	100.2	100.8	99.4	10.1	132.5	130.7	
20:23:42	00:04:00	7.5	7.4	30.2	2.1	100.9	100.3	101.4	101.1	100.5	101.0	99.8	10.1	132.6	130.6	
20:24:42	00:05:00	8.8	8.8	30.2	2.5	5.4	101.1	100.5	101.3	100.7	101.0	99.9	10.1	132.5	130.5	
20:25:43	00:06:00	10.3	10.2	3.0.2	3.0.2	7.3	101.3	100.8	101.7	101.5	101.0	101.2	100.2	101.5	10.6	
20:26:43	00:07:01	11.6	11.5	30.2	3.5	101.3	100.8	101.7	101.5	101.0	101.2	100.2	101.5	10.6	132.4	
20:27:43	00:08:01	12.9	12.8	30.2	3.4	7.2	101.4	100.8	101.8	101.6	101.1	101.3	100.2	101.5	10.1	
20:28:43	00:09:01	14.1	14.1	30.2	3.4	7.2	101.4	100.8	101.8	101.6	101.1	101.3	100.0	101.4	10.3	
20:29:43	00:10:01	15.7	15.6	30.2	3.9	8.2	101.4	101.0	101.8	101.6	101.1	101.3	100.3	102.5	132.4	
20:30:43	00:11:01	17.1	17.0	30.2	3.9	8.2	101.4	101.9	101.8	101.6	101.3	101.0	99.9	101.6	132.5	
20:31:43	00:12:01	18.3	18.2	30.2	4.3	9.1	101.5	101.1	101.9	101.7	101.3	101.5	100.4	101.0	132.3	
20:32:43	00:13:01	19.7	19.5	30.2	4.3	9.1	101.5	101.0	101.9	101.7	101.3	101.5	100.4	101.9	132.3	
20:33:43	00:14:01	21.0	20.9	30.2	4.8	10.1	101.5	101.0	101.9	101.6	101.2	101.5	100.3	101.8	132.1	
20:34:43	00:15:01	22.4	22.3	30.2	5.2	11.0	101.6	101.2	101.8	101.3	101.5	100.4	99.9	101.2	132.9	
20:35:44	00:16:01	23.8	23.7	30.2	5.2	11.0	101.6	101.2	101.8	101.4	101.5	100.5	101.9	101.8	132.2	
20:36:44	00:17:02	25.3	25.1	30.2	5.2	11.0	101.6	101.2	102.0	101.8	101.4	101.7	100.5	99.9	101.2	
20:37:44	00:18:02	26.6	26.5	30.2	5.2	11.0	101.7	101.2	102.1	101.8	101.4	101.7	100.5	99.9	101.2	
20:38:44	00:19:02	28.0	27.9	30.2	5.2	11.0	101.7	101.2	102.1	101.8	101.4	101.7	100.6	100.2	132.0	
AIR BACKFILL(2)		SUMMARY		CALC. AVG.		CH1		CH2		CH3		CHIA		CH2A		
CYCLE	PHASE	PX-1	PX-2	PX-4	CH	CH1	CH2	CH3	CHIA	CH2A	CH3A	JR	JS	PXRTR VAP GAS	MNFLD MNTR EO	EO GAS
TIME	TIME	PRESS	PRESS	PRESS	HUMID	HUMID	HUMID	HUMID	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP
HH:MM:SS	HH:MM:SS	('HgA)	('HgA)	('HgA)	(%RH)	(%RH)	(%RH)	(%RH)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
20:39:41	00:00:00	29.3	29.2	30.2	5.7	11.9	101.7	101.3	102.1	101.9	101.5	101.7	100.6	100.4	102.9	
20:40:41	00:01:00	29.3	29.2	30.2	5.7	11.9	101.7	101.3	102.1	101.9	101.5	101.7	100.6	100.4	102.9	
20:41:41	00:02:00	29.5	29.4	30.2	5.7	11.9	101.6	101.1	101.8	101.9	101.3	101.5	100.7	103.0	109.7	
20:42:41	00:03:00	29.6	29.5	30.2	5.7	11.9	101.7	101.2	101.9	102.1	101.4	101.5	100.7	103.1	110.7	
20:43:42	00:04:00	30.3	30.1	30.2	6.1	12.8	101.8	101.4	102.0	101.2	101.5	101.7	100.9	104.2	113.2	
LIFT TABLE NOT LOWERED ALARM		8/10/2016 9:51:25 AM		CALC. AVG.		CH1		CH2		CH3		CHIA		CH2A		
CYCLE	PHASE	PX-1	PX-2	PX-4	CH	CH1	CH2	CH3	CHIA	CH2A	CH3A	JR	JS	PXRTR VAP GAS	MNFLD MNTR EO	EO GAS
TIME	TIME	PRESS	PRESS	PRESS	HUMID	HUMID	HUMID	HUMID	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP
HH:MM:SS	HH:MM:SS	('HgA)	('HgA)	('HgA)	(%RH)	(%RH)	(%RH)	(%RH)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
20:44:34	00:05:53	30.3	30.1	30.2	7.0	14.7	101.8	101.4	101.9	102.2	101.5	101.5	100.8	104.5	113.3	131.8
20:44:42	00:05:06	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.2	131.8	129.0
20:44:53	00:06:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:45:00	00:07:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:45:07	00:08:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:45:14	00:09:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:45:21	00:10:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:45:28	00:11:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:45:35	00:12:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:45:42	00:13:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:45:49	00:14:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:45:56	00:15:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:46:03	00:16:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:46:10	00:17:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:46:17	00:18:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:46:24	00:19:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:46:31	00:20:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:46:38	00:21:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:46:45	00:22:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:46:52	00:23:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:46:59	00:24:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:47:06	00:25:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:47:13	00:26:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:47:20	00:27:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:47:27	00:28:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:47:34	00:29:53	30.3	30.1	30.2	7.5	15.6	101.8	101.4	101.9	102.2	101.6	101.5	100.8	113.3	131.8	129.0
20:47:41	00:30:53	30.3	30.1	30.2	7.5	15.6	101.8									

Chamber A
Clinical Product Run

CYCLE NO: 000000492

STERILIZER NUMBER: 0001033693

cm

```

START PRESS: 0002.0 MAX PRESS: 0029.3 MAX TEMP: 101.8 DRM1 START: 293.0 DRM2 START: 671.1 MAX PRE TEMP: 129.1 MAX GAS TEMP: 083.8
END PRESS: 0029.3 MIN PRESS: 0002.0 MIN TEMP: 098.8 DRM1 END: 293.0 DRM2 END: 671.1 MIN PRE TEMP: 128.2 MIN GAS TEMP: 083.4
PRESS CHANGE: 027.3 ETO USED 1: 000.0 ETO USED 2: 000.0 MAX VAP TEMP: 130.0
EO USED PHASE: 000.0 EO USED CYCLE: 022.7 MIN VAP TEMP: 128.4

```

CYCLE TIME	PHASE TIME	END OF CYCLE		PX-1		PX-2		PX-4		CH		CALC.		AVG.		CH1		CH2		CH3		CH1A		CH2A		CH3A		JR		JS		PRTR		VAP		GAS		MNFLD		MNTR		EO		EO		GAS	
		hh:mm:ss	hh:mm:ss	PRESS	PRESS	PRESS	PRESS	HUMID	HUMID	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	DRM1	DRM2	CONC																									
20:58:39	0:00:00	29.3	29.3	30.2	30.2	12.4	12.4	26.4	26.4	101.1	101.1	101.5	101.5	101.2	100.7	101.8	101.5	101.3	100.7	102.9	128.2	128.4	83.7	85.6	111.3	293.0	671.1	0.7																			
20:58:39	0:00:00	29.3	29.3	30.2	30.2	12.4	12.4	26.4	26.4	101.1	101.1	101.5	101.5	101.2	100.7	101.8	101.5	101.3	100.7	102.9	128.2	128.4	83.7	85.6	111.3	293.0	671.1	0.7																			
20:58:39	0:00:00	29.3	29.3	30.2	30.2	12.4	12.4	26.4	26.4	101.1	101.1	101.5	101.5	101.2	100.7	101.8	101.5	101.3	100.7	102.9	128.2	128.4	83.7	85.6	111.3	293.0	671.1	0.7																			
20:58:39	0:00:00	29.3	29.3	30.2	30.2	12.4	12.4	26.4	26.4	101.1	101.1	101.5	101.5	101.2	100.7	101.8	101.5	101.3	100.7	102.9	128.2	128.4	83.7	85.6	111.3	293.0	671.1	0.7																			
20:58:39	0:00:00	29.3	29.3	30.2	30.2	12.4	12.4	26.4	26.4	101.1	101.1	101.5	101.5	101.2	100.7	101.8	101.5	101.3	100.7	102.9	128.2	128.4	83.7	85.6	111.3	293.0	671.1	0.7																			

Chamber B
Clinical Product Run

Empty Chamber Runs

Process Summary

* COVIDIEN *
* *****

CHAMBER 103369-2

DATE: 08/10/2016
TIME: 2:30:39 PM

CYCLE NUMBER: 517 Last Modification Date/Time: 6/18/2015 11:51:17 AM
CYCLE COUNTER NUMBER: 00000505

LOAD NUMBER 1: EPA TEST
LOAD NUMBER 2: 50 lbs cycle 1 of 2
LOAD NUMBER 3:
LOAD NUMBER 4:
LOAD NUMBER 5:
LOAD NUMBER 6:

OPERATOR ID NUMBER: 00003365

	TEMPERATURE	UNIT :	PRESSURE	UNIT :	WEIGHT	UNIT :
Jacket Temperature	: 105.0	°F	: 105.0	'HgA		Lbs.
Jacket Offset	: 5.0	°F				
Chamber Temperature	: 98.0	°F				
Chamber High Temperature Alarm	: 27.0	°F				
Chamber High Temperature Warning	: 17.0	°F				
Chamber Low Temperature Alarm	: 15.0	°F				
Chamber Low Temperature Warning	: 10.0	°F				
Vaporizer Temperature	: 115.0	°F				
Vaporizer High Temperature Alarm	: 20.0	°F				
Vaporizer High Temperature Warning	: 10.0	°F				
Vaporizer Low Temperature Alarm	: 130.0	°F				
Vaporizer Low Temperature Warning	: 20.0	°F				
Preheater High Temperature Alarm	: 10.0	°F				
Preheater High Temperature Warning	: 50.0	Lbs.				
Aabort Temperature	: 140.0	°F				
Abort Pressure	: 36.0	'HgA				
Diff Temp	: 3.0	°F				
Steam Valve Duty Cycle	: 2.0	%				
Internal Recirculation	: YES					
Door Crack Time	: 00:05:00					

Appendix H

Performance Test

PHASE 01	STANDBY	INITIAL EVACUATION(1)	Rate Control:Use	Rate Control
Jacket Temperature	: 105.0	°F	: 105.0	°F
Jacket Offset	: 5.0	°F	: 5.0	°F
Chamber Temperature	: 98.0	°F	: 98.0	°F
Chamber High Temperature Alarm	: 27.0	°F	: 27.0	°F
Chamber High Temperature Warning	: 17.0	°F	: 17.0	°F
Chamber Low Temperature Alarm	: 15.0	°F	: 15.0	°F
Chamber Low Temperature Warning	: 10.0	°F	: 10.0	°F
Vaporizer Temperature	: 115.0	°F	: 115.0	°F
Vaporizer High Temperature Alarm	: 20.0	°F	: 18.0	°F
Vaporizer High Temperature Warning	: 10.0	°F	: 9.0	°F
Vaporizer Low Temperature Alarm	: 130.0	°F	: 18.0	°F
Vaporizer Low Temperature Warning	: 20.0	°F	: 9.0	°F
Preheater Temperature	: 10.0	°F	: 130.0	°F
Preheater High Temperature Alarm	: 50.0	Lbs.	: 20.0	°F
Preheater High Temperature Warning	: 140.0	°F	: 10.0	°F
Preheater Low Temperature Alarm	: 36.0	'HgA	: 20.0	°F
Preheater Low Temperature Warning	: 3.0	°F	: 10.0	°F
Initial Evacuation Level	: 2.0	%	: 2.0	'HgA
Evacuation Pressure Reduction Per Minute	: YES		: 2.5	'HgA
Evacuation Fast Increment Alarm			: 10.0	'HgA
Evacuation Slow Increment Alarm			: 10.0	'HgA
Evacuation Slow Rate Stop Level			: 5.0	'HgA
Print Interval			: 00:01:00	
Maximum Phase Time			: 01:00:00	

Performance Test

Appendix H

PHASE 03 STABILIZATION		PHASE 04 LEAK CHECK	
Jacket Temperature	: 105.0 °F	Jacket Temperature	: 105.0 °F
Jacket Offset	: 5.0 °F	Jacket Offset	: 5.0 °F
Chamber Temperature	: 98.0 °F	Chamber Temperature	: 98.0 °F
Chamber High Temperature Alarm	: 27.0 °F	Chamber High Temperature Alarm	: 27.0 °F
Chamber High Temperature Warning	: 17.0 °F	Chamber High Temperature Warning	: 17.0 °F
Chamber Low Temperature Alarm	: 15.0 °F	Chamber Low Temperature Alarm	: 15.0 °F
Chamber Low Temperature Warning	: 10.0 °F	Chamber Low Temperature Warning	: 10.0 °F
Vaporizer Temperature	: 115.0 °F	Vaporizer Temperature	: 115.0 °F
Vaporizer High Temperature Alarm	: 20.0 °F	Vaporizer High Temperature Alarm	: 20.0 °F
Vaporizer High Temperature Warning	: 10.0 °F	Vaporizer High Temperature Warning	: 10.0 °F
Vaporizer Low Temperature Alarm	: 20.0 °F	Vaporizer Low Temperature Alarm	: 20.0 °F
Vaporizer Low Temperature Warning	: 10.0 °F	Vaporizer Low Temperature Warning	: 10.0 °F
Preheater Temperature	: 130.0 °F	Preheater Temperature	: 130.0 °F
Preheater High Temperature Alarm	: 20.0 °F	Preheater High Temperature Alarm	: 20.0 °F
Preheater High Temperature Warning	: 10.0 °F	Preheater High Temperature Warning	: 10.0 °F
Preheater Low Temperature Alarm	: 20.0 °F	Preheater Low Temperature Alarm	: 20.0 °F
Preheater Low Temperature Warning	: 10.0 °F	Preheater Low Temperature Warning	: 10.0 °F
Internal Recirculation	: YES	Vacuum Leak Level Alarm	: 0.5 ''HgA
Phase Time	: 00:01:00	Internal Recirculation	: YES
Print Interval	: 00:01:00	Phase Time	: 00:05:00
Print Interval	: 00:01:00	Phase Time	: 00:01:00
PHASE 05 HUMIDIFICATION(1) Humidity Control:Pressure Control		PHASE 06 INITIAL N2 WASH(1) Rate Control:Use Rate Control	
Jacket Offset	: 5.0 °F	Jacket Temperature	: 105.0 °F
Chamber Temperature	: 98.0 °F	Jacket Offset	: 5.0 °F
Chamber High Temperature Alarm	: 27.0 °F	Chamber Temperature	: 98.0 °F
Chamber High Temperature Warning	: 17.0 °F	Chamber High Temperature Alarm	: 27.0 °F
Chamber Low Temperature Alarm	: 15.0 °F	Chamber Low Temperature Warning	: 17.0 °F
Chamber Low Temperature Warning	: 10.0 °F	Chamber Low Temperature Alarm	: 15.0 °F
Vaporizer Temperature	: 115.0 °F	Vaporizer Temperature	: 10.0 °F
Vaporizer High Temperature Alarm	: 20.0 °F	Vaporizer High Temperature Warning	: 115.0 °F
Vaporizer High Temperature Warning	: 10.0 °F	Vaporizer High Temperature Alarm	: 20.0 °F
Vaporizer Low Temperature Alarm	: 18.0 °F	Vaporizer High Temperature Warning	: 10.0 °F
Vaporizer Low Temperature Warning	: 9.0 °F	Vaporizer Low Temperature Alarm	: 20.0 °F
Vaporizer Low Temperature	: 130.0 °F	Vaporizer Low Temperature Warning	: 10.0 °F
Preheater High Temperature Alarm	: 20.0 °F	Preheater Temperature	: 130.0 °F
Preheater High Temperature Warning	: 10.0 °F	Preheater High Temperature Alarm	: 20.0 °F
Preheater Low Temperature Alarm	: 18.0 °F	Preheater High Temperature Warning	: 10.0 °F
Preheater Low Temperature Warning	: 9.0 °F	Preheater Low Temperature Alarm	: 20.0 °F
Humidity Level	: 2.1 ''HgA	Preheater Low Temperature Warning	: 10.0 °F
Internal Recirculation	: YES	Initial N2 Wash Level	: 29.0 ''HgA
Maximum Phase Time	: 01:00:00	Injection Pressure Increment Per Minute	: 2.5 ''HgA
Print Interval	: 00:01:00	Injection Fast Increment Alarm	: 10.0 ''HgA
End Humidity Low Limit	: 10.0 mg/l	Injection Slow Increment Alarm	: 10.0 ''HgA
End Humidity High Limit	: 100.0 mg/l	Internal Recirculation	: YES
Cycle Time to Event Minimum	: 00:01:00	Maximum Phase Time	: 01:00:00
Cycle Time to Event Maximum	: 01:00:00	Print Interval	: 00:02:00
Final Pressure Minimum Level	: 29.5 ''HgA	Final Pressure Maximum Level	: 28.5 ''HgA
Phase Time Minimum	: 00:10:00	Phase Time Maximum	: 00:45:00
Phase Time Maximum	: 00:45:00		

PHASE 08 INITIAL N2 WASH(2)		Rate Control:Use Rate Control
Jacket Temperature	:	105.0 °F
Jacket Offset	:	5.0 °F
Chamber Temperature	:	98.0 °F
Chamber High Temperature Alarm	:	27.0 °F
Chamber High Temperature Warning	:	17.0 °F
Chamber Low Temperature Alarm	:	15.0 °F
Chamber Low Temperature Warning	:	10.0 °F
Vaporizer Temperature	:	115.0 °F
Vaporizer High Temperature Alarm	:	20.0 °F
Vaporizer High Temperature Warning	:	10.0 °F
Vaporizer Low Temperature Alarm	:	20.0 °F
Vaporizer Low Temperature Warning	:	10.0 °F
Preheater Temperature	:	130.0 °F
Preheater High Temperature Alarm	:	20.0 °F
Preheater High Temperature Warning	:	10.0 °F
Preheater Low Temperature Alarm	:	20.0 °F
Preheater Low Temperature Warning	:	10.0 °F
Initial Evacuation Level	:	2.0 ''HgA
Evacuation Pressure Reduction Per Minute	:	2.5 ''HgA
Evacuation Fast Increment Alarm	:	10.0 ''HgA
Evacuation Slow Increment Alarm	:	10.0 ''HgA
Evacuation Slow Rate Stop Level	:	5.0 ''HgA
Print Interval	:	00:01:00
Maximum Phase Time	:	01:00:00
Internal Recirculation	:	YES
Final Pressure Minimum Level	:	1.5 ''HgA
Final Pressure Maximum Level	:	2.5 ''HgA
Phase Time Minimum	:	00:10:00
Phase Time Maximum	:	00:45:00

PHASE 09 STERILANT INJECTION(1)		Rate Control:Use Rate Control
Jacket Offset	:	5.0 °F
Chamber Temperature	:	98.0 °F
Chamber High Temperature Alarm	:	27.0 °F
Chamber High Temperature Warning	:	17.0 °F
Chamber Low Temperature Alarm	:	15.0 °F
Chamber Low Temperature Warning	:	10.0 °F
Vaporizer Temperature	:	115.0 °F
Vaporizer High Temperature Alarm	:	20.0 °F
Vaporizer High Temperature Warning	:	10.0 °F
Vaporizer Low Temperature Alarm	:	20.0 °F
Vaporizer Low Temperature Warning	:	10.0 °F
Preheater Temperature	:	130.0 °F
Preheater High Temperature Alarm	:	20.0 °F
Preheater High Temperature Warning	:	10.0 °F
Preheater Low Temperature Alarm	:	20.0 °F
Preheater Low Temperature Warning	:	10.0 °F
Nitrogen Blanket Pressure	:	29.0 ''HgA
Injection Pressure Increment Per Minute	:	2.5 ''HgA
Injection Fast Increment Alarm	:	10.0 ''HgA
Injection Slow Increment Alarm	:	10.0 ''HgA
Internal Recirculation	:	YES
Maximum Phase Time	:	01:00:00
Print Interval	:	00:01:00
Final Pressure Minimum Level	:	23.5 ''HgA
Final Pressure Maximum Level	:	25.7 ''HgA

Appendix H

Performance Test

PHASE 11 EXPOSURE (1)		PHASE 12 STERILANT REMOVAL Rate Control:Use Rate Control	
Jacket Offset	: 5.0 °F	Jacket Temperature	: 100.0 °F
Chamber Temperature	: 98.0 °F	Jacket Offset	: 5.0 °F
Chamber High Temperature Alarm	: 27.0 °F	Chamber Temperature	: 98.0 °F
Chamber Low Temperature Alarm	: 17.0 °F	Chamber High Temperature Alarm	: 27.0 °F
Vaporizer Low Temperature Warning	: 15.0 °F	Chamber Low Temperature Warning	: 17.0 °F
Vaporizer Temperature	: 10.0 °F	Vaporizer Low Temperature Alarm	: 15.0 °F
Vaporizer High Temperature Alarm	: 20.0 °F	Vaporizer Low Temperature Warning	: 10.0 °F
Vaporizer High Temperature Warning	: 10.0 °F	Vaporizer High Temperature Alarm	: 20.0 °F
Vaporizer Low Temperature Alarm	: 20.0 °F	Vaporizer High Temperature Warning	: 10.0 °F
Vaporizer Low Temperature Warning	: 10.0 °F	Vaporizer Low Temperature Alarm	: 20.0 °F
Preheater Temperature	: 115.0 °F	Vaporizer Low Temperature Warning	: 10.0 °F
Preheater High Temperature Alarm	: 20.0 °F	Vaporizer High Temperature Alarm	: 115.0 °F
Preheater High Temperature Warning	: 10.0 °F	Vaporizer High Temperature Warning	: 20.0 °F
Preheater Low Temperature Alarm	: 20.0 °F	Vaporizer High Temperature Alarm	: 10.0 °F
Preheater Low Temperature Warning	: 10.0 °F	Vaporizer Low Temperature Warning	: 20.0 °F
Gas Makeup Differential Pressure	: 0.5 ''HgA	Vaporizer Low Temperature Alarm	: 10.0 °F
Maximum Gas Makeups	: 30	Vaporizer Low Temperature Warning	: 10.0 °F
Exposure Pressure Offset	: 0.5 ''HgA	Preheater Temperature	: 130.0 °F
High Pressure Warning	: 0.6 ''HgA	Preheater High Temperature Alarm	: 20.0 °F
Low Pressure Warning	: 0.8 ''HgA	Preheater High Temperature Warning	: 10.0 °F
High Pressure Alarm	: 0.8 ''HgA	Vaporizer High Temperature Alarm	: 10.0 °F
Low Pressure Alarm	: YES	Vaporizer High Temperature Warning	: 20.0 °F
Internal Recirculation	: YES	Preheater Low Temperature Alarm	: 20.0 °F
Phase Time	: 02:00:00	Preheater Low Temperature Warning	: 10.0 °F
Print Interval	: 00:01:00	Sterilant Removal Vacuum Level	: 5.0 ''HgA
Minimum Pressure Level	: 28.0 ''HgA	Evacuation Pressure Reduction Per Minute	: 1.5 ''HgA
Maximum Pressure Level	: 29.5 ''HgA	Evacuation Fast Increment Alarm	: 5.0 ''HgA
Low Temperature Minimum	: 90.0 °F	Evacuation Slow Increment Alarm	: 5.0 ''HgA
High Temperature Maximum	: 110.0 °F	Evacuation Slow Rate Stop Level	: 7.0 ''HgA
Low Gas Concentration Minimum	: 300.0 mg/l	Print Interval	: 00:01:00
High Gas Concentration Maximum	: 650.0 mg/l	Maximum Phase Time	: 01:30:00
Phase Time Minimum	: 00:00:01	Internal Recirculation	: YES
Phase Time Maximum	: 01:15:00	Final Pressure Minimum Level	: 4.5 ''HgA
Time In Specification Minimum	: 00:00:01	Final Pressure Maximum Level	: 5.5 ''HgA
Time In Specification Maximum	: 01:15:00	Phase Time Minimum	: 00:15:00
		Phase Time Maximum	: 01:30:00
PHASE 13 POST N2 WASH(1) Rate Control:Use Rate Control		PHASE 14 POST EVACUATION(1) Rate Control:Use Rate Control	
Jacket Temperature	: 100.0 °F	Jacket Temperature	: 100.0 °F
Jacket Offset	: 5.0 °F	Jacket Offset	: 5.0 °F
Chamber Temperature	: 98.0 °F	Chamber Temperature	: 98.0 °F
Chamber High Temperature Alarm	: 27.0 °F	Chamber High Temperature Alarm	: 27.0 °F
Chamber High Temperature Warning	: 17.0 °F	Chamber High Temperature Warning	: 17.0 °F
Chamber Low Temperature Alarm	: 15.0 °F	Chamber Low Temperature Alarm	: 15.0 °F
Chamber Low Temperature Warning	: 10.0 °F	Chamber Low Temperature Warning	: 10.0 °F
Vaporizer Temperature	: 115.0 °F	Vaporizer Temperature	: 115.0 °F
Vaporizer High Temperature Alarm	: 20.0 °F	Vaporizer High Temperature Alarm	: 20.0 °F
Vaporizer High Temperature Warning	: 10.0 °F	Vaporizer High Temperature Warning	: 10.0 °F
Vaporizer Low Temperature Alarm	: 20.0 °F	Vaporizer Low Temperature Alarm	: 20.0 °F
Vaporizer Low Temperature Warning	: 10.0 °F	Vaporizer Low Temperature Warning	: 10.0 °F
Preheater Temperature	: 130.0 °F	Preheater Temperature	: 130.0 °F
Preheater High Temperature Alarm	: 20.0 °F	Preheater High Temperature Alarm	: 20.0 °F

Performance Test

Appendix H

Preheater High Temperature Warning	:	10.0 °F
Preheater Low Temperature Alarm	:	20.0 °F
Preheater Low Temperature Warning	:	10.0 °F
Post N2 Wash Level	:	28.5 °HgA
Injection Pressure Increment Per Minute	:	2.5 °HgA
Injection Fast Increment Alarm	:	10.0 °HgA
Injection Slow Increment Alarm	:	10.0 °HgA
Print Interval	:	00:01:00
Maximum Phase Time	:	00:45:00
Internal Recirculation	:	YES
Final Pressure Minimum Level	:	27.0 °HgA
Final Pressure Maximum Level	:	28.5 °HgA
Phase Time Minimum	:	00:05:00
Phase Time Maximum	:	00:45:00
PHASE 15 AIR BACKFILL(1) (Loop:1 Count:3)		
Jacket Temperature	:	100.0 °F
Jacket Offset	:	5.0 °F
Chamber Temperature	:	98.0 °F
Chamber High Temperature Alarm	:	27.0 °F
Chamber High Temperature Warning	:	17.0 °F
Chamber Low Temperature Alarm	:	15.0 °F
Chamber Low Temperature Warning	:	10.0 °F
Injection Pressure Increment Per Minute	:	2.5 °HgA
Injection Fast Increment Alarm	:	10.0 °HgA
Injection Slow Increment Alarm	:	10.0 °HgA
Internal Recirculation	:	YES
Maximum Phase Time	:	00:05:00
Print Interval	:	00:01:00
Final Pressure Minimum Level	:	29.0 °HgA
Final Pressure Maximum Level	:	29.5 °HgA
Phase Time Minimum	:	00:10:00
Phase Time Maximum	:	00:45:00
PHASE 16 POST EVACUATION(2) (Loop:1 Count:3)		
Jacket Temperature	:	100.0 °F
Jacket Offset	:	5.0 °F
Chamber Temperature	:	98.0 °F
Chamber High Temperature Alarm	:	27.0 °F
Chamber High Temperature Warning	:	17.0 °F
Chamber Low Temperature Alarm	:	15.0 °F
Chamber Low Temperature Warning	:	10.0 °F
Vaporizer Temperature	:	115.0 °F
Vaporizer High Temperature Alarm	:	20.0 °F
Vaporizer High Temperature Warning	:	10.0 °F
Vaporizer Low Temperature Alarm	:	20.0 °F
Vaporizer Low Temperature Warning	:	10.0 °F
Preheater Temperature	:	130.0 °F
Preheater High Temperature Alarm	:	20.0 °F
Preheater High Temperature Warning	:	10.0 °F
Preheater Low Temperature Alarm	:	20.0 °F
Preheater Low Temperature Warning	:	10.0 °F
Post Evacuation Level	:	5.0 °HgA
Evacuation Pressure Reduction Per Minute	:	2.5 °HgA
Evacuation Fast Increment Alarm	:	10.0 °HgA
Evacuation Slow Increment Alarm	:	10.0 °HgA
Evacuation Slow Rate Stop Level	:	5.0 °HgA
Print Interval	:	00:01:00
Maximum Phase Time	:	00:05:00
Internal Recirculation	:	YES
Final Pressure Minimum Level	:	4.5 °HgA
Final Pressure Maximum Level	:	5.5 °HgA
Phase Time Minimum	:	00:05:00
Phase Time Maximum	:	01:00:00
PHASE 17 AIR BACKFILL(2) Rate Control:Use Rate Control		
Jacket Temperature	:	100.0 °F
Jacket Offset	:	5.0 °F
Chamber Temperature	:	98.0 °F
Chamber High Temperature Alarm	:	27.0 °F
Chamber High Temperature Warning	:	17.0 °F
Chamber Low Temperature Alarm	:	15.0 °F
Chamber Low Temperature Warning	:	10.0 °F
Injection Pressure Increment Per Minute	:	2.5 °HgA
Injection Fast Increment Alarm	:	10.0 °HgA
Injection Slow Increment Alarm	:	10.0 °HgA

Performance Test

cm

AIR BACKTILL(2)	08/10/2016 17:46:32																								
PHASE	PX-1	PX-2	PX-4	CH	CALC.	Avg.	CH1	CH2	CH3	CH1A	CH2A	CH3A	JR	JS	PRHTR	VAP	GAS	MNFLD	MNTR	EO	EO	GAS			
TIME	PRESS	PRESS	PRESS	HUMID	HUMID	TEMP	DRM1	DRM2	CONC																
hh:mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	(mg/l)	(mg/l)	(°F)	(lbs.)	(lbs.)	(mg/l)																
3:15:53	0:00:00	5.0	4.9	30.0	-0.2	-0.4	94.2	93.7	94.5	94.5	93.6	94.6	93.4	99.5	100.4	129.1	115.3	87.5	90.5	111.0	279.8	650.3	0.1		
3:16:53	0:01:00	7.2	7.1	30.0	-0.2	-0.4	97.7	97.1	98.1	97.1	97.7	96.5	100.2	104.3	129.2	115.3	87.4	90.5	110.9	279.8	650.3	0.1			
3:17:53	0:02:00	9.4	9.3	30.0	-0.2	-0.3	101.0	100.5	101.3	100.7	100.6	99.7	100.3	102.7	129.0	115.2	87.4	90.5	110.9	279.8	650.3	0.2			
3:18:53	0:03:00	11.8	11.6	30.0	-0.2	-0.3	102.9	102.4	103.1	102.7	102.3	101.6	99.5	100.0	129.1	115.2	87.4	90.5	110.9	279.8	650.3	0.2			
3:19:53	0:04:00	14.1	13.9	30.0	-0.2	-0.3	104.0	103.5	104.1	104.5	103.8	103.2	102.7	101.9	107.7	129.2	115.2	87.4	90.4	110.9	279.8	650.2	0.1		
3:20:53	0:05:00	16.4	16.2	30.0	-0.2	-0.3	104.7	104.2	104.7	105.2	104.5	103.9	103.6	99.8	101.0	129.1	115.1	87.4	90.3	110.9	279.8	650.3	0.1		
3:21:54	0:06:00	18.6	18.5	30.0	-0.2	-0.3	105.1	104.5	105.1	105.6	104.8	104.3	103.9	99.6	99.9	129.1	115.1	87.3	90.2	110.9	279.8	650.3	0.1		
3:22:54	0:07:01	20.8	20.7	30.0	-0.2	-0.3	105.2	104.7	105.3	105.6	104.9	104.7	104.2	99.5	99.8	129.1	115.1	87.3	90.1	110.9	279.8	650.2	0.1		
3:23:54	0:08:01	23.1	22.9	30.0	-1.6	3.1	105.3	104.7	105.5	105.6	105.0	104.9	104.3	99.5	99.8	128.9	115.0	87.3	90.0	110.9	279.8	650.2	0.1		
3:24:54	0:09:01	25.5	25.4	30.0	1.6	3.1	105.4	104.8	105.6	105.1	105.0	104.3	99.5	99.8	128.9	114.9	87.2	89.8	110.9	279.8	650.3	0.1			
3:25:54	0:10:01	27.6	27.4	30.0	1.6	3.1	105.5	104.9	105.7	105.2	104.4	99.5	99.8	129.1	115.0	87.3	89.8	110.9	279.8	650.3	0.1				
AIR BACKTILL(2) SUMMARY		08/10/2016 17:57:10																							
CYCLE	PHASE	PX-1	PX-2	PX-4	CH	CALC.	Avg.	CH1	CH2	CH3	CH1A	CH2A	CH3A	JR	JS	PRHTR	VAP	GAS	MNFLD	MNTR	EO	EO	GAS		
TIME	TIME	TIME	TIME	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	DRM1	DRM2	CONC				
hh:mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	(mg/l)	(mg/l)	(%RH)	(%RH)	(°F)	(Lbs.)	(Lbs.)	(mg/l)														
3:26:31	0:10:38	29.2	29.0	30.0	1.6	3.1	105.5	104.9	105.8	105.6	105.2	104.4	99.5	99.8	129.0	114.9	87.3	89.7	110.8	279.8	650.2	0.1			

Appendix H

START PRESS: 0005.0 MAX PRESS: 0029.2 MAX TEMP: 105.3 DRM1 START: 279.8 DRM2 START: 650.3 MAX PRE TEMP: 129.3 MAX GAS TEMP: 087.5
END PRESS: 0029.2 MIN PRESS: 0005.0 MIN TEMP: 093.4 DRM1 END: 279.8 DRM2 END: 650.2 MIN PRE TEMP: 128.7 MIN GAS TEMP: 087.2
PRESS CHANGE: 024.2 ETO USED 1: 0000.0 ETO USED 2: 0000.0 MAX VAP TEMP: 115.4

ETO USED PHASE: 000.0 EO USED CYCLE:049.0

END OF CYCLE	08/10/2016 17:57:10																					
PHASE	PX-1	PX-2	PX-4	CH	CALC.	Avg.	CH1	CH2	CH3	CH1A	CH2A	CH3A	JR	JS	PRHTR	VAP	GAS	MNFLD	MNTR	EO	EO	GAS
TIME	PRESS	PRESS	PRESS	HUMID	HUMID	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	TEMP	DRM1	DRM2	CONC							
hh:mm:ss	hh:mm:ss	hh:mm:ss	hh:mm:ss	(mg/l)	(mg/l)	(%RH)	(%RH)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(Lbs.)	(Lbs.)	(mg/l)	
4:26:31	0:00:00	29.2	29.0	30.0	1.6	3.1	105.5	104.9	105.8	105.6	105.2	104.4	99.5	99.8	129.0	114.9	87.3	89.7	110.8	279.8	650.2	0.1
4:26:31	0:00:00	29.2	29.0	30.0	1.6	3.1	105.5	104.9	105.8	105.6	105.3	104.4	99.5	99.8	129.0	114.9	87.3	89.7	110.8	279.8	650.2	0.1
4:26:31	0:00:00	29.2	29.0	30.0	1.6	3.1	105.5	104.9	105.8	105.6	105.3	104.4	99.5	99.8	129.0	114.9	87.3	89.7	110.8	279.8	650.2	0.1
4:26:31	0:00:00	29.2	29.0	30.0	1.6	3.1	105.5	104.9	105.8	105.6	105.3	104.4	99.5	99.8	129.0	114.9	87.3	89.7	110.8	279.8	650.2	0.1

Chamber A
Empty Chamber Run 1

TIME	PHASE	PX-1	PX-2	PX-4	CH	CALC.	Avg.	CH1	CH2	CH3	CH2A	CH3A	JR	JS	PRHTR	VAP	GAS	MNFLD	MNTR	EO	EO	GAS		
3:13:24	0:01:00	7.2	7.1	30.1	2.4	5.8	97.2	97.7	97.0	97.0	98.0	97.2	97.5	100.0	101.1	130.8	115.1	86.7	89.8	108.5	293.2	618.8	0.8	
3:14:25	0:02:00	9.6	9.5	30.1	2.9	6.3	100.3	100.7	99.9	100.3	101.2	100.3	101.2	100.0	101.1	130.7	115.1	86.8	89.8	108.5	293.2	618.8	0.8	
3:15:25	0:03:00	11.9	11.9	30.1	2.9	6.0	102.1	102.4	102.9	102.3	103.3	100.0	101.1	101.1	101.1	130.7	115.0	86.7	89.7	108.5	293.2	618.8	0.8	
3:16:25	0:04:00	14.1	14.1	30.1	3.3	6.7	103.2	103.4	102.7	103.4	104.0	103.4	104.5	100.1	101.2	130.6	115.0	86.7	89.5	108.5	293.2	618.8	0.7	
3:17:25	0:05:00	16.3	16.2	30.1	3.8	7.5	103.8	103.9	103.4	104.1	104.5	104.1	105.0	100.2	101.2	130.6	114.9	86.7	89.4	108.5	293.2	618.8	0.7	
3:18:25	0:06:00	18.5	18.5	30.1	3.4	6.6	104.2	104.3	103.9	104.3	104.8	104.6	105.2	100.2	101.2	130.4	114.8	86.7	89.2	108.4	293.2	618.8	0.8	
3:19:25	0:07:01	20.9	20.9	30.1	3.8	7.4	104.5	104.6	104.4	104.5	105.1	105.0	105.3	100.3	101.3	130.4	114.8	86.7	89.1	108.4	293.2	618.8	0.8	
3:20:25	0:08:01	23.2	23.2	30.1	3.8	7.3	104.7	104.8	104.6	104.6	105.3	105.2	105.3	100.3	101.4	130.2	114.8	86.7	88.9	108.4	293.2	618.8	0.8	
3:21:25	0:09:01	25.4	25.4	30.1	4.7	9.1	104.8	105.0	104.9	104.6	105.4	105.4	105.3	100.4	101.5	130.2	114.8	86.7	88.8	108.5	293.2	618.8	0.7	
3:22:25	0:10:01	27.6	27.6	30.1	4.2	8.1	104.9	105.1	104.6	105.4	105.6	105.3	100.4	101.5	130.1	114.7	86.7	88.7	108.5	293.2	618.8	0.7		
AIR BACKFILL(2) SUMMARY		08/10/2016 17:53:30																						
CYCLE	PHASE	PX-1	PX-2	PX-4	CH	CALC.	Avg.	CH1	CH2	CH3	CH2A	CH3A	JR	JS	PRHTR	VAP	GAS	MNFLD	MNTR	EO	EO	GAS		
TIME	TIME	PRESS	PRESS	PRESS	HUMID	HUMID	TEMP	DRM1	DRM2	CONC														
hh:mm:ss	hh:mm:ss	(''HgA)	(''HgA)	(''HgA)	(mg/L)	(%RH)	(°F)	(Lbs.)	(Lbs.)	(mg/l)														
3:23:06	0:10:41	29.2	29.2	29.2	30.1	4.7	9.0	105.0	105.2	105.3	104.6	105.5	105.7	105.3	100.5	101.6	130.1	114.7	86.7	88.6	108.5	293.2	618.8	0.8

START PRESS: 0005.0 MAX PRESS: 0029.2 MAX TEMP: 105.8 DRM1 START: 293.2 DRN2 START: 618.8 MAX PRE TEMP: 131.0 MAX GAS TEMP: 086.8
END PRESS: 0029.2 MIN PRESS: 0005.0 MIN TEMP: 093.8 DRM1 END: 293.2 DRN2 END: 618.8 MIN VAP TEMP: 130.0 MIN GAS TEMP: 086.7
PRESS CHANGE: 024.2 ETO USED PHASE: 000.0 ETO USED CYCLE: 051.9 ETO USED 1: 000.0 ETO USED 2: 000.0 ETO USED 3: 000.0 MIN VAP TEMP: 114.6

END OF CYCLE	TIME	PX-1	PX-2	PX-4	CH	CALC.	Avg.	CH1	CH2	CH3	CH2A	CH3A	JR	JS	PRHTR	VAP	GAS	MNFLD	MNTR	EO	EO	GAS	
08/10/2016 17:53:30																							
CYCLE	TIME	PRESS	PRESS	PRESS	HUMID	HUMID	TEMP	DRM1	DRM2	CONC													
	hh:mm:ss	hh:mm:ss	(''HgA)	(''HgA)	(''HgA)	(mg/L)	(%RH)	(°F)	(Lbs.)	(Lbs.)	(mg/l)												
	0:00:00	29.2	29.2	30.1	4.7	9.0	105.0	105.2	105.3	104.6	105.5	105.7	105.3	100.5	101.6	130.1	114.7	86.7	88.6	108.5	293.2	618.8	0.8
	DRUM 1 EMPTY ALARM RESET	08/10/2016 17:53:30																					

Chamber B

Empty Chamber Run 1

Performance Test

START PRESS:	0005.0	MAX PRESS:	0029.2	MAX TEMP:	105.4	DRM1 START:	279.8	DRM2 START:	601.5	MAX PRE TEMP:	133.2	MAX GAS TEMP:	086.9
END PRESS:	0029.2	MIN PRESS:	0005.0	MIN TEMP:	093.5	DRM1 END:	279.8	DRM2 END:	601.5	MIN PRE TEMP:	132.4	MIN GAS TEMP:	086.5
PRESS CHANGE:	024.2					ETO USED 1:	000.0	ETO USED 2:	000.0	MAX VAP TEMP:	117.1		
		EO USED PHASE:	000.0	EO USED CYCLE:	048.4					MIN VAP TEMP:	116.6		

	FLD	MTR	EO	EO	GAS
	MP	TEMP	DRM1	DRM2	CONC
	(°F)	(°F)	(lbs.)	(lbs.)	(mg/l)
.1	110.8	279.8	601.5	0.1	

Chamber H Empty Chamber Run 2

COV2016-2



Performance Test

CYCLE NO: 0000000496

STERILIZER NUMBER: 0001033693

3:23:38	0:09:01	25.3	25.3	30.1	4.3	8.1	105.0	105.1	105.0	104.9	105.4	105.5	105.5	102.0	106.4	129.8	114.1	88.0	88.0	107.9	293.2	312.4	0.8	
3:24:38	0:10:01	27.7	27.7	30.1	4.3	8.1	105.1	105.2	105.2	104.9	105.5	105.6	105.4	99.5	99.0	129.6	114.1	85.9	87.9	107.9	293.2	572.3	0.7	
	AIR BACKTILT(2)						08/10/2016	21:24:19																
	SUMMARY																							
CYCLE	PHASE	PX-1	PX-2	PX-4	CH	CALC.	AVG.	CH1	CH2	CH3	CH1A	CH2A	CH3A	JR	JS	PRHTR	VAP	GAS	MNFID	MNTR	EO	EO	GAS	
TIME	TIME	PRESS	PRESS	PRESS	HUMD	HUMD	TEMP	TEMP	DRM1	DRM2	CONC													
hh:mm:ss	hh:mm:ss	(^o FHG)	(^o FHG)	(^o FHG)	(mg/l)	(%)RH	(^o F)	(Lbs.)	(Lbs.)	(mg/l)														
3:25:21	0:10:44	29.2	29.2	30.1	4.7	8.9	105.2	105.3	105.4	104.8	105.7	105.8	105.4	101.9	105.9	129.6	114.1	86.0	87.8	107.9	293.2	572.3	0.7	

START PRESS:	0005.0	MAX PRESS:	0029.2	MAX TEMP:	105.8	DRM1 START:	293.2	DRM2 START:	572.3	MAX PRE TEMP:	130.6	MAX GAS TEMP:	086.2
END PRESS:	0029.2	MIN PRESS:	0005.0	MIN TEMP:	093.9	DRM1 END:	293.2	DRM2 END:	572.3	MIN PRE TEMP:	129.6	MIN GAS TEMP:	085.8
PRESS CHANGE:	024.2					ETO USED 1:	000.0	ETO USED 2:	000.0	MAX VAP TEMP:	114.5		

EO USED PHASE: UUU.U EO USED CYCLE:046.2
MIN VAP TEMP: 114.0

Chamber B Empty Chamber Run 2

Performance 1

COV2016-2



APPENDIX I

PROTOCOL ADDENDUM LETTER

July 25, 2016

Mr. Darren Fortescue
USEPA
5 Post Office Square, Suite 100
Mail Code: OES04-02
Boston, MA 02109

RE: Sterilizer Performance Test Protocol Addendum 2
Project Id: COV2016-2

Dear Mr. Fortescue:

Canomara LLC (CM) has had discussions with EPA pertaining to the Sterilizer Initial Performance Test Protocol submitted on June 22, 2016. These discussions indicated the proposed test methods, quality control, number and duration of tests, and process operating conditions were acceptable, however, additional information related to continuous compliance monitoring was requested. The additional information is presented below.

1. Catalytic Oxidizer Continuous Compliance Monitoring - The catalytic oxidizer continuous compliance monitoring is conducted by temperature monitoring at the combined outlet of the 3-bed catalytic oxidizer in accordance with 40CFR63.364(c). The temperature data are recorded at 10-second intervals which meets the requirements of 40CFR63.364(c). The thermocouple used for this compliance monitoring is identified as TTISLAH 25.611. This thermocouple is calibrated every 6 months and a copy of the most recent calibration is attached.

Other temperatures, including the exit temperatures of each catalyst bed and the combined inlet (TTICSH 72.610), are also measured and recorded. These other thermocouples can provide temperature change (ΔT) data for the three catalyst beds; however, the LESNI is a unique system that limits the heat input to the catalyst beds with the balancer and the limited heat input minimizes the ΔT across the catalyst beds, so that unlike conventional catalytic oxidizers ΔT is not an indicator of performance. Conventional catalytic oxidizers can have large changes in temperature across the bed when there is high heat input from contaminant gases. In summary, all temperature data are recorded and data are available for inspection; however, only the combined bed outlet thermocouple is used for continuous compliance monitoring which meets the requirements of the rule and is an appropriate parameter for a balancer/catalytic oxidizer system.

PROTOCOL ADDENDUM

Covidien Sterilizer Initial Performance Test

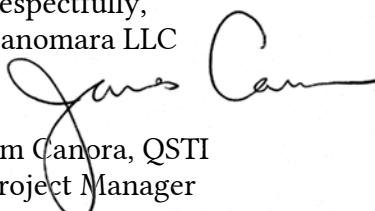
Page 2 / 2

2. HFID Averaging Time for Compliance Threshold - We are proposing the following: the HFID data system records 1-minute averages and these 1-minute averages will be used to set the continuous compliance monitoring threshold. The threshold will be calculated as the average of the highest measured concentration from the three 1-hour performance tests. For example, if the highest 1-minute concentrations from the three tests are 275, 300 and 325 ppm as propane, then the HFID 1-minute limit will be 330 ppm as propane (300 ppm +10%).
3. Process Schematic in the Protocol Appendix D – The temperatures indicated on this schematic are not site specific temperatures for Covidien. This schematic shows 150 °C on the catalyst inlet and 165 °C on the outlet and the Covidien controlling set-point is 150 °C on the outlet. When the Covidien chambers are not under evacuation, the inlet and outlet temperatures are nearly identical or slightly higher on the inlet and catalyst outlet temperature may only rise slightly during normal evacuations.

If you have any questions or need additional information, please contact me at any time.

Respectfully,

Canomara LLC


Jim Canora, QSTI
Project Manager

Work Order Internal Calibration

On-Site Calibration with own Result Set (Cal-Points Not in Maximo? - Y/N) N

Site: NHCAL

Work Order: NH-232535

LESNI - Temperature probe

Work Order Status: CLOSE

Asset: NH10222

LESNI - Temperature probe

Asset Status: LIMITEDUSE

Location: 47

Sterilizer RAE DIPINO

Physical Location: 47

PM Calibration: PM.NH10222

LESNI - Temperature probe

Parent Location: NORTHHAVEN

Manufacturer:

Cal Frequency: 6

MONTHS Next Calibration: Jan 7, 2017

Date of Calibration: Jul 7, 2016

Model: P&ID NUMBER 25.611

Calibration Job Plan: JP.MPRO-006

Thermometers

Work Type: CAL

Serial Number:

Data Sheet: NH-DS01231

Temp_150degC_T5.6_singlept

Revision: 0

Certificate Number:

Baro Pressure:

As Found Status: PASS

As Found Comment:

Temperature: 72

Deg F

As Left Status: PASS

As Left Comment:

Humidity: 48

%RH

Work Order Tasks

Task ID Description

- 10 Calibration - Follow SOP# MPRO-006
- 20 Perform 3 measurements of each calibration point if able
- 30 If unable to perform 3 measurements, assess for 5-10 sec

Data Sheet Asset Function & Calibration Points

Data Sheet Rev	Asset Function	Calibration Point	Nominal		Set Point		Input		Output		Tollerance 1 Error		As Left Status	
			As Found	As Left	As Found	As Left	Units	As Found	As Left	As Found	As Left	As Found	As Left	
NH-DS01231 0	5 Stds ACCY min 4:1 (1=Y,0=N) Deviations in long txt	1 VISUAL			1		1 Visual					0	0	PASS
NH-DS01231 0	20 Gauge is Clean/ Undamaged (1=Yes, 0=No)	1 Visual			1		1 Visual					0	0	PASS
NH-DS01231 0	30 Measure CAL PTS 3x (1=Y,0=N) DISCREPS in long txt	1 Visual			1		1 Visual					0	0	PASS
NH-DS01231 0	40 Nominal 150 deg C tol +/- 5.6 deg C	10 Nominal 150 deg C tol +/- 5.6 deg C	150.0	150.0			Deg C	159.3	159.3	157.8	157.8	0.0	0.0	PASS

Actual Tools

Tool Description

Rotating Asset Description

Comment

NH01693 Hum/Temp monitor 605-H1

NH01693 Hum/Temp monitor 605-H1 SN

Work Order Internal Calibration

On-Site Calibration with own Result Set (Cal-Points Not in Maximo? - Y/N) N

Site: NHCAL

Work Order: NH-232535

LESNI - Temperature probe

Actual Tools

Tool Description	Rotating Asset Description	Comment
NH06720 Martel Temp Std	NH06720 Martel Temp Std	

APPENDIX J

TEST METHOD DESCRIPTIONS

EPA Method 18

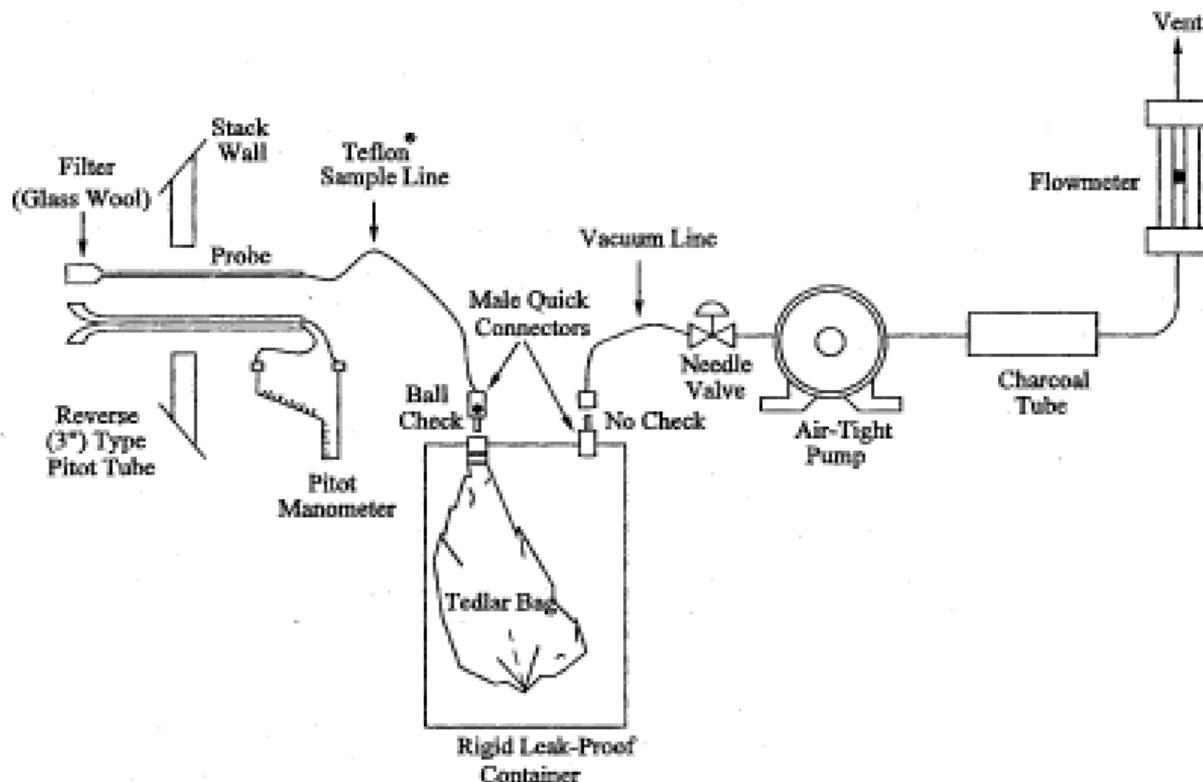
Gaseous Organic Compound Emissions by Gas Chromatography (Integrated Bag Sampling and Analysis)

Page 1 / 6

SUMMARY

Sample gas is collected in a Tedlar bag at a constant rate and the bag sample is analyzed by gas chromatography for volatile organic compounds. A sampling train schematic is shown below and photographs are attached.

SAMPLING TRAIN



Sampling Components:

- Glass or stainless steel probe of sufficient length to reach required sample points.
- An in-stack or out-of-stack filter made of material which is non-reactive to the sample gas. The filter is not required where no significant particulate matter is present.
- Sample line made of Teflon or other material that does not absorb or alter the sample gas.
- Rigid gas tight container with compression type fittings
- Flexible bags constructed of Tedlar or other inert material
- Gas flow meter or critical orifice flow controller
- Leak-free pump constructed of non-reactive material to pull sample through the system at a sufficient rate to minimize the response time.

Analytical Components

- SRI Inc. Model 8610C gas chromatograph, laptop computer with Peaksimple software and USB cable
- Restek MXT-1 60 meter steel capillary column (test protocol will specify other column type if required)

Revised: 02/5/2016

EPA Method 18

Gaseous Organic Compound Emissions by Gas Chromatography (Integrated Bag Sampling and Analysis)

Page 2 / 6

- High purity hydrogen, nitrogen and air
- CGA 350, 580 and 590 gas cylinder regulators with 1/8-inch tubing connectors
- 1,000 cc gas syringe
- Printer (optional as all chromatography files are saved)

SAMPLING PROCEDURES

- Assemble the sampling system and conduct a leak check.
- For critical orifice flow controllers, calibrate the sampling rate with a gas flow calibrator.
- Set sampling rate to fill a Tedlar bag approximately 80% full over the test period. A typical sampling rate is 0.16 liters per minute to collect a 9.6 liter sample in a 12 liter bag over a 1-hour period.
- Position the probe at the first sampling point and purge the system for at least two times the response time.
- Record sampling data on a prepared form. Sampling data may include dry gas meter volume, flow meter ball level, temperature, vacuum and pressure.

ANALYTICAL PROCEDURES

- Set up SRI Model 8610C chromatograph in accordance with manufacturer specifications.
- Confirm that all calibration gas certifications are complete and not expired.
- Conduct a 3-level calibration on the gas chromatograph for each target compound using commercially available gas standards. Each gas standard must be analyzed three times and the responses must be within 5% of the mean for each target compound.
- Analyze samples after completing the initial calibration. Samples are also analyzed in triplicate and responses must be within 5% of the mean.
- Periodically analyze zero grade nitrogen or air to demonstrate system is contamination free.
- Prepare a bag recovery spike using one of the sample bags. The recovery spike is prepared using a gas syringe (see attached photograph) and one of the calibration standards. Inject a volume of standard gas into the sample bag to increase the target compound concentration by 40-60%. Analyze the spiked sample in triplicate and calculate recovery using the Method 18 controlled spreadsheet. Sample values are corrected using a spike recovery factor.
- After completing sample analyses, re-analyze the mid-level calibration gas in triplicate. If the average value of each target compound is within 5% of the initial value, the initial calibration can be used to quantify the samples. If the post-test calibration varies by more than 5% of the initial calibration, then the 3-point calibration must be repeated and both pre and post-test calibrations must be used for sample quantification.

EPA Method 18

Gaseous Organic Compound Emissions by Gas Chromatography (Integrated Bag Sampling and Analysis)

Page 3 / 6

QUALITY ASSURANCE

Sampling System:

- Sample flow rate should be $\pm 2\%$.
- Leak rate should be 0.00 liters per minute at 5 inches Hg vacuum

Chromatography Analysis:

- Standards, samples and spikes must be analyzed in triplicate and responses must be within 5% of the mean.
- Spike recovery must be within 70 – 130%.

Calibration Gas:

- Calibration uncertainty of $\leq 2\%$ certified value
- Gas used only prior to expiration date

CALCULATIONS

Triplicate Injection:

$$Dev = \frac{(RP_{avg} - RP)}{RP_{avg}} \times 100$$

RP Chromatograph response in area units

RP_{avg} Average response of three injections

Dev Deviation from the mean value

Drift Assessment:

$$D = |SB_{final} - SB_i|$$

D Drift assessment, percent of calibration span

SB_{final} Post-run system response for the mid-level gas

SB_i Pre-run system response for the mid-level gas

Spike Recovery Correction:

$$C_{Gas} = C_{Avg} \times R$$

C_{Gas} Average effluent gas concentration adjusted for spike recovery, ppmv

C_{Avg} Average unadjusted gas concentration for the test run, ppmv

R Recovery Factor

Revised: 02/5/2016

EPA Method 18

Gaseous Organic Compound Emissions by Gas Chromatography (Integrated Bag Sampling and Analysis)

Page 4 / 6

Recovery Study:

EPA Method 18 Section 8.4.2 Recovery Study for Bag Sampling Example Calculation

	Sample ID	Post Analysis Sample Volume (l)	Un-Spiked Sample Response (u) (ppm)	Compound Volume in Sample (ul)	Standard Volume Added to Sample (L)	Standard Conc (ppm)	Compound Volume from Standard (ul)	Spiked Bag Total Conc (ppm)	Theoretical Spike Conc (s) (ppm)	Spiked Sample Response (t) (ppm)	(t-u)/s Recovery (%)
Compound 1	Run 1	6.977	0.0	0.0	0.400	9.4	3.752	0.51	0.51	0.50	98.3%

Spiked Sample Analysis

Injection No.	Concentration (ppm)				Deviation		
	1	2	3	average (t)			
Compound 1	0.50	0.50	0.50	0.50	0.0%	0.0%	0.0%

$$\text{Recovery} = (t-u)/s \times 100$$

$$= (0.50-0.00)/0.51 \times 100 = 98.3\%$$

Bag Sample Volume meter Y= 0.9828

Temp (°F)	Meter Volume (liters)	Pbar	Standard Volume (liters)
60.0	7.055	30.08	7.127

Sample Volume Used for Initial Analyses

# of injections	rate (cc/min)	time (min)	Volume (liters)
3	50	1	0.15

Detection Limit

Detection limit is determined by analyzing the low standard seven times and applying a standard statistical analysis. An example of the detection limit determination is shown below.

Standard	Response (ppm) ¹							Average	Standard Deviation	MDL (ppm) ²
	1	2	3	4	5	6	7			
1.00	1.181	1.129	1.166	1.171	1.183	1.185	1.182	1.1710	0.020	0.062

1. The low standard is analyzed 7 consecutive times.

2. MDL (ppm) = STDEV x 3.143

STDEV = standard deviation of the response for 7 injections of the low standard

3.143 = Student T-value for n-1 degrees of freedom at a 99% confidence

Revised: 02/5/2016

EPA Method 18

Gaseous Organic Compound Emissions by Gas Chromatography (Integrated Bag Sampling and Analysis)

Page 5 / 6

Mass Emission Rate

Pollutant mass emission rate in pounds per hour (lb/hour) is calculated from the measured concentration and exhaust gas flow rate as follows:

$$ER = ppmw \times \text{molecular weight} \times \text{scfm} \times 15.58 \times 10^{-8}$$

ER = emission rate (lb/hour)

ppmw = parts per million by volume – wet basis

scfm = standard cubic feet per minute (wet)

Mass Basis Destruction Efficiency

Mass basis destruction efficiency is calculated with measured pollutant flow rates at the control device inlet and outlet using the following calculation:

$$\text{Destruction Efficiency (\%)} = (ER_{in} - ER_{out})/ER_{in} \times 100$$

ER_{in} = control device inlet pollutant flow rate (lb/hour)

ER_{out} = control device outlet pollutant flow rate (lb/hour)

EPA Method 18

Gaseous Organic Compound Emissions by Gas Chromatography
(Integrated Bag Sampling and Analysis)

Page 6 / 6

COMPONENT IMAGES

SRI, Inc. Model 8610C Gas Chromatograph:



EPA Method 18 Bag Sampling Device and Gas Syringe for Recovery Study:



Revised: 02/5/2016

cm

EPA Method 25a

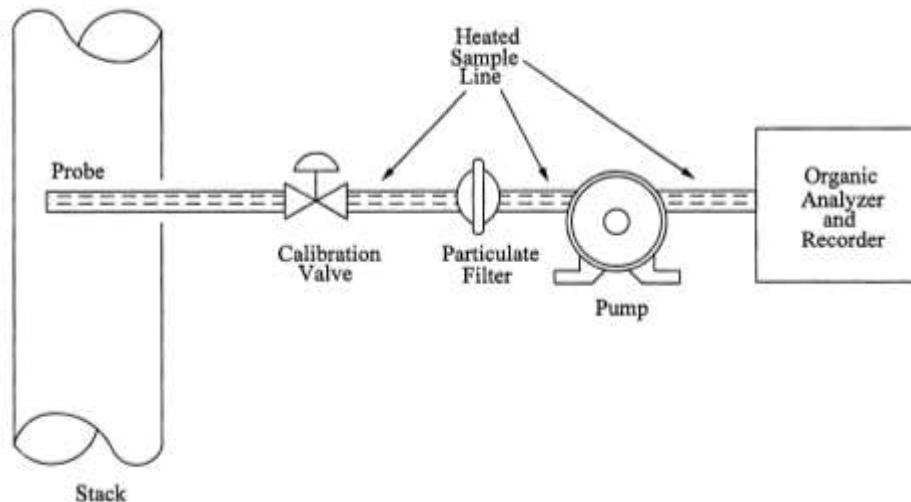
Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer

Page 1 / 3

SUMMARY

A gas sample is extracted from the source through a heated sample line and glass fiber filter to a flame ionization analyzer.

SAMPLING TRAIN



Components:

- Stainless steel probe heated to ≥ 220 °F.
- A glass fiber in-stack filter or a glass fiber out-of-stack filter heated to ≥ 220 °F. The filter is not required where no significant particulate matter is present.
- Teflon or stainless steel sample line heated to ≥ 220 °F.
- Leak-free pump constructed of non-reactive material to pull sample through the system at a sufficient rate to minimize the response time.
- Manifold constructed of non-reactive material to allow the introduction of calibration gases into the measurement system at the probe.
- Flame ionization analyzer capable of meeting all performance requirements.
- Computer based data acquisition system for recording measurements.

EPA Method 25a

Determination of Total Gaseous Organic Concentration
Using a Flame Ionization Analyzer

Page 2 / 3

SAMPLING PROCEDURES

- Assemble the sampling system and conduct a leak check.
- Confirm that all calibration gas certifications are complete and not expired.
- Conduct an analyzer calibration error test sending gas through the entire measurement system.
- Conduct a response time test.
- Position the probe so that sample is collected from the centrally located 10% area of the stack.
- Begin sampling after ≥ 2 times the sampling response time has passed.
- Conduct a post-run drift assessment check.

QUALITY ASSURANCE

Measurement System:

- Calibration error is verified to be within $\pm 5\%$ of the calibration gas value
- Drift is verified to be within $\pm 3\%$ of the span value

NO_x Analyzer:

- Analyzer used for testing has undergone manufacturer interference checks
- Analyzer resolution is $< 2.0\%$ full-scale range

Calibration and Support Gas:

- Calibration uncertainty of $\leq 2\%$ certified value
- High purity air zero gas < 0.1 ppmv organic material
- Low-level calibration gas 25-35% of the applicable span value
- Mid-level gas 45-55% of the applicable span value
- High-level gas 80-90% of the applicable span value
- Fuel consisting of 100% H₂

Data:

- Data collection and calculations are conducted on a reviewed computer based system
- Data resolution $\leq 0.5\%$ full-scale range
- Data recording frequency of ≤ 1 -minute average
- Minute averages \leq calibration span
- Run average \leq calibration span

EPA Method 25a

Determination of Total Gaseous Organic Concentration
Using a Flame Ionization Analyzer

Page 3 / 3

CALCULATIONS

Analyzer Calibration Error:

$$ACE = \frac{C_s - C_v}{C_v} \times 100$$

ACE Analyzer calibration error, percent of calibration gas value

C_s Measured concentration of a calibration gas through the sampling system, ppmv

C_v Manufacturer certified concentration of a calibration gas (low, mid, high), ppmv

Drift Assessment:

$$D = \frac{C_s - C_i}{CS} \times 100$$

D Drift assessment, percent of span

C_s Measured concentration of a calibration gas through the sampling system, ppmv

C_i Initial analyzer response, ppmv

CS Calibration span, ppmv